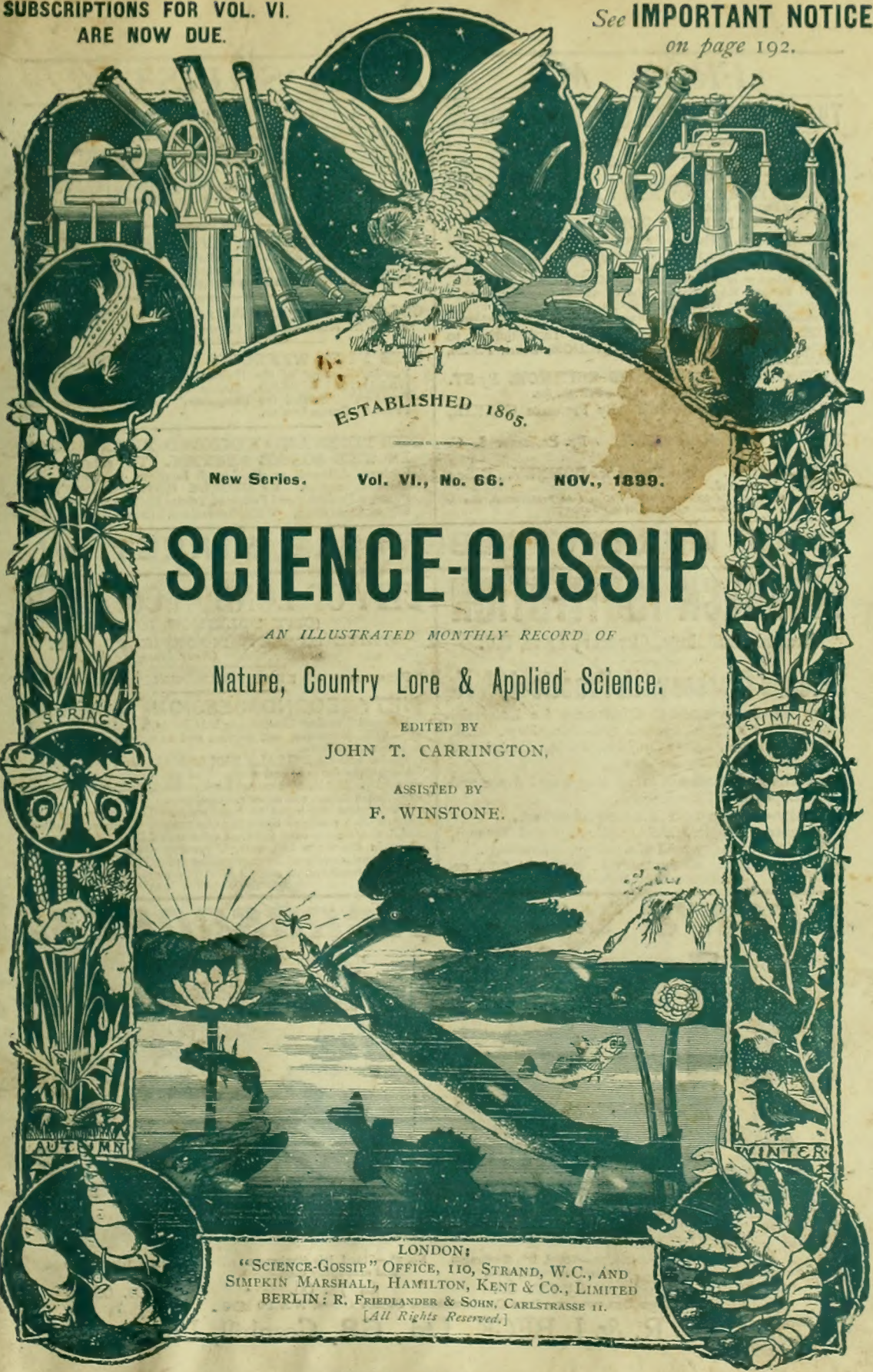
SUBSCRIPTIONS FOR VOL. VI. ARE NOW DUE.

See IMPORTANT NOTICE *on page* 192.



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SCIENCE-GOSSIP

AN ILLUSTRATED MONTHLY RECORD OF

Nature, Country Lore & Applied Science.

EDITED BY
JOHN T. CARRINGTON.

ASSISTED BY
F. WINSTONE.

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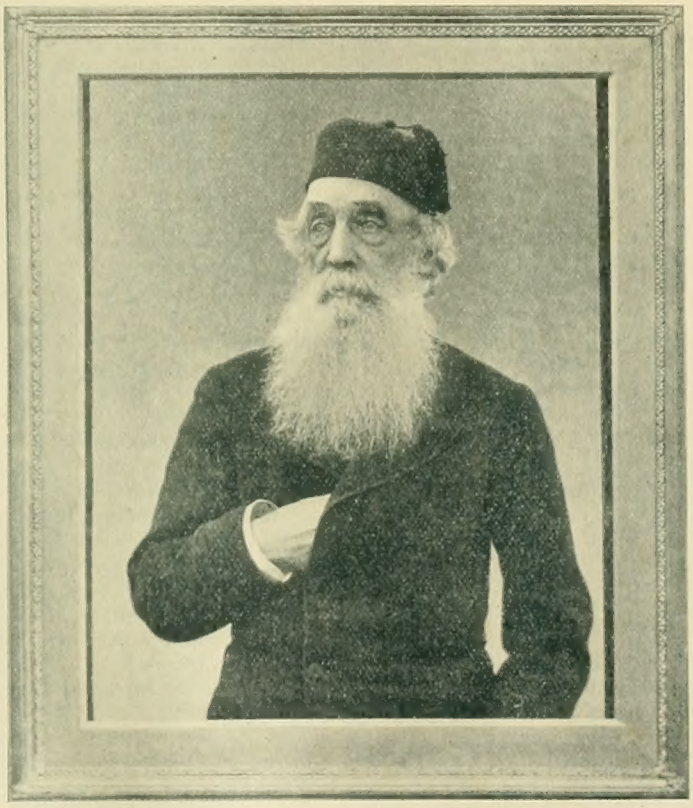
PRICE SIXPENCE.

SAMUEL STEVENS.

THE name of Stevens has been so long associated with the historic auction rooms in King Street, Covent Garden, that independently of the late Mr. Samuel Stevens' scientific attainments, his death marks a period. He was born on the 11th of March, 1817, we believe at Kennington, in the suburbs of London, his father being John Stevens, a man of artistic taste, which has been transmitted in a marked manner down to the present generation. Samuel suffered from delicate health in his childhood and youth, when his chief occupation was drawing with a lead pencil. In this art he must have excelled, for at the early age of thirteen he took the Royal Society of Art's medal for two drawings, of which he was naturally proud to the end of his life. They occupied a place of honour on the wall of the entrance hall in his house at Beulah Hill. He applied himself so closely to his drawing that it was feared his health would suffer, and his parents reluctantly stopped his progress. He then devoted his attention to the study of Natural History and the acquisition of specimens, which was his recreation and pleasure to the end of his life. Entomology occupied his chief attention, and he consequently amassed a large collection covering several Orders. This he has left to his nephew, Mr. John Stevens, but it is probable that it will be dispersed in the King Street rooms.



SAMUEL STEVENS.

The Stevens' Auction Rooms were founded in 1760 apparently by King and Lochee. They were joined later by a Mr. Thomas, and about 1818 a brother of Samuel Stevens became partner to the latter, eventually succeeding to the business which is still known by his name. He was the celebrated John Crase Stevens.

During the early part of his life, Samuel does not appear to have had any special occupation, but in 1840 he joined in partnership with his brother, J. C. Stevens, with whom he remained unti 1848, when he left to establish a Natural History agency at 24, Bloomsbury Street, acting among others for Messrs. Wallace and Bates in their Amazonian explorations. On the death of Mr. J. C. Stevens in 1859 Samuel took charge of the King Street business on behalf of the widow, and continued until his nephews, Henry and Joseph, took over the management. During that time he had continued his Bloomsbury business, but in 1867 he sold it to a Mr. Higgins, and later it was closed. Afterwards the subject of our notice devoted all his time as an amateur to Natural History pursuits. He was a regular attendant at the Entomological Society and frequently at the Linnean, of both of which he was a fellow. He was also a member of the Entomological Club, being a member for 50 years. In fact Samuel Stevens was long considered as the doyen of the entomological fraternity in this country. His pleasant smile and genial words being familiar at most scientific functions for

the past half-century, his capacity as agent, and his connection with the sale-rooms, added to his love for natural history, brought Samuel Stevens in touch with most of the leading British naturalists of the nineteenth century. Of these he retained many pleasant reminiscences. It was only recently that he discussed with the writer of this notice the propriety of publishing his memoirs, but this, like so many other mundane things, was delayed too long.

We are indebted to Mr. Henry Stevens, the chief of the present firm in King Street, for the accompanying photographic likeness. It was jokingly taken by the artist with his subject standing behind an empty frame, but it is exceedingly life-like and characteristic. It may be mentioned, in connection with the artistic tendency of the Stevens' family, that Mr. Henry's reputation as an amateur photographer is world-wide, and much of his work has never been surpassed by the most skilled professional artist. It is doubtless well-known to our readers, as he is a constant exhibitor at the leading photographic exhibitions.

JOHN T. CARRINGTON.

EXOTIC COCCIDAE IN AUSTRALIA.

By JAMES LIDGETT.

DURING recent years many species of exotic Coccidae have been found infesting indigenous, as well as introduced plants in Australia. It has occurred to me that a list of them, together with their food-plants, would be both useful and interesting to those studying these important parasitic insects, especially from their economic aspect.

The facility now afforded for the transportation of insect life has already been the means of spreading far and wide, such well-known and dreaded pests as the "pernicious" or San José scale (*Aspidiotus perniciosus* of Comstock), and the fluted scale (*Icerya purchasi* Maskell). This latter insect was unknown to science prior to the year 1877 when it was discovered and described in New Zealand. Now it is found on the five Continents. Australia is undoubtedly the original home of *Icerya purchasi*, if not of all the genus *Icerya*. I have often been asked the meaning of the name *purchasi*, as it not being generally known that it is in honour of Dr. Purchase, of Auckland, New Zealand.

An example, showing the facility of transmitting living Coccidae through the post, the following extract from a letter just received from Mr. E. Ernest Green, of Ceylon, is of considerable interest:—"In examining your material of *Dactylopius* from *Acacia dealbata*, I was much interested to find a living larva of some Coccinellid beetle that had been feeding upon them. . . . Now that there is so much discussion about the importation of beneficial insects to wage war against scale insects, this accidental introduction is of considerable interest." The packet took seventeen days in transit from Australia.

The following are exotic species of scale insects already found in Australia:—

1. *Aspidiotus aurantii* Mask. (= *coccineus* Genn.). Infests *Citrus*.

2. *A. camelliae* Bois. (= *rapax* Comst.). Infests *Camellia*, *Olea*, etc.

3. *A. ficus* Comst. On *Citrus*.

4. *A. nerii* Bouche. On *Oleander citrus*, *Acacia*, etc.

5. *Aspidiotus perniciosus* Comst. On Apple, Pear, *Eucalyptus*, of course exogenitically. There is a great deal of confusion existing as to the correct identification of *A. perniciosus*. A species, *eucalypti* of Mask., is a very closely allied species and occurs on *Eucalyptus*. *A. perniciosus* may thus possibly turn out to be a native of Australia. At present Japan is supposed to be its original home.

6. *Diaspis boisduvalii* Sign. On a variety of species of *Acacia*, *Orchids*, etc.

7. *Diaspis rosae* Sandbg. On rose and *Smilax*.

8. *Mytilaspis gloverii* Pack. On *Citrus*.

9. *Mytilaspis citricola* Pack. On species of *Croton*, *Banksia integrifolia* (exogenitically).

10. *Mytilaspis pomorum* Bouche. On apple, plum, and many other trees, (*passim*).

11. *Chionaspis brasiliensis* Sign. On orchids, ferns, etc.

12. *Chionaspis citri* Comst. On *Citrus*.

13. *Ischnaspis filiformis* Douglas. On palms. Probably indigenous to all tropical regions, and therefore to North Australia.

14. *Lecanium anthurii* Boisduval. On *Asparagus*.

15. *Lecanium filicum* Boid. On *Lomaria* sp.

16. *Lecanium hemisphaericum* Targ. (= *hibernaculorum*). On *Camellia japonica*, *Laurus*, *Buxus*, and many other plants, (*passim*).

17. *Lecanium hesperidum* Linn. On *Laurus*, *Citrus*, etc. (*passim*).

18. *Lecanium nigrum* Neisher. On *Hakea* sp. and many plants.

20. *Lecanium oleae* Bernard. On *Camellia japonica*, *Citrus*, *Psidium* sp., Olea, etc.

21. *Lecanium ribis* Fitch. On *Ribes grossularia*.

22. *Lecanium rosarum* Snellen. On *Ribes* sp.

23. *Lecanium tessellatum* Sign. On *Laurus nobilis*.

24. *Lecanium berberidis* Schrank. On *Vitis vinifera* (grape vine).

25. *Planchonia fimbriata* Boy. de Fons. On *Leptosperma flavescens*.

26. *Dactylopius adonidum* Linn. On *Carduus* sp.

27. *Dactylopius yamiae* Lucus. On *Zamia spiralis*.

28. *Icerya Aegyptica* Doug. On *Goodenia ovata* (exogenitically).

29. *I. rosae* Riley and Howard. On *Hakea gibbosa*.

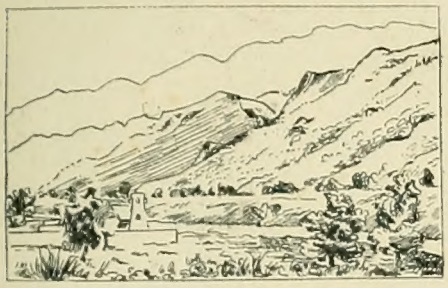
Myrniong,

Victoria. 20th April, 1899.

THE VALLEY OF THE TOCHI RIVER.

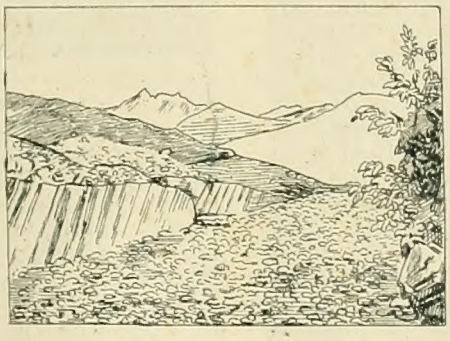
By Major B. M. Skinner, R.A.M.C.

THIS outlying corner of the British Empire in India forms a portion of Waziristan, the boundary of which was delineated in 1894-5 by an Anglo-Afghan Commission from the Afghan provinces of Khost on the north and Birmul on the west. In



Tochi Valley.—Talus Slopes of Nummulitic Limestone.

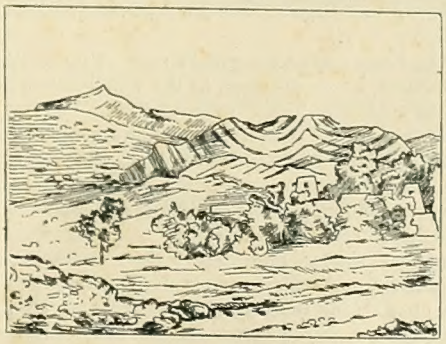
1897 it was for a time a spot of some interest, owing to an expedition which marched up there to avenge a treacherous assault upon our troops, which was made at Maizar in June of that year by the Madda Khel, a section of the tribe of the Darwesh Khel Waziris who inhabit the locality.



Lake Gravel lying on Upturned Strata.

The portion of the Tochi Valley which forms the subject of these remarks is a small tract of country lying between, roughly, 69°.40 and 70°.10 E., and 32°.50 and 33°.10 N., through which the Tochi River flows from west to east to empty itself into the Kurram. Generally speaking, the vicinity of the Tochi river is a rugged country of bare rocky hills, varying in altitude from about 2,900 to 7,900ft. The land rises from east to west, and is intersected by precipitous water-channels. The only cultivation is along the banks of the main streams, such as the Tochi, and its tributaries the Kazha and Shawal rivers. There patches of alluvial soil have been skilfully irrigated by carefully constructed water-courses, so as to facilitate the production of grain, for the consumption of the inhabitants of the numerous villages dotted along the banks. Such villages form oases in an uninviting barren-looking region, and occasionally present an almost civilised appearance, with their crops of Indian corn, or rice, their fruit-trees, and sometimes vines. A feature that strikes one here, in common with other neighbouring Mohammedan countries, is the extensive burial grounds with their mounds of stones, often arranged in colour-patterns, to mark the graves. These mounds, lying as they do over hollow graves, are liable to sink in and so form pitfalls for the unwary, who may then realise, should such a mishap befall them, the origin of the old tradition in England, that it is unlucky to walk over a grave.

The inhabitants appear to the white man as being about as dirty-looking as is possible. Their clothing, sometimes worn for a year without washing, is so offensive olfactorily, that it is advisable to stand to windward of the wearer, if it becomes necessary to converse with him. They are essentially an agricultural population, who in order to protect themselves and their irrigation channels from their neighbours of adjacent villages, have to rely on their fortifications for defence. For that purpose their villages contain stone towers, similar structures being erected outlying their villages to guard their crops, and their water-supply. They possess an excellent breed of sheep, whose mutton is of high quality. The generally barren appearance of the rock-strewn country makes one wonder how these flocks obtain subsistence, but the scantiness of the herbage is somewhat compensated by the wide extent of the grazing ground. The people can not be said to have any manufacturing industry.



On Road between Boia and Miramshah.

At one time iron-smelting was carried out in the country towards the north. This has been

discontinued, as better weapons than they could make can be obtained elsewhere in the present day, without the trouble attendant on making them themselves, in a country where fuel is extremely scanty. The contents of a mound of a deserted village in the vicinity of Boia, explored by the writer, showed that an industry in copper-smelting in a small way once existed; this, however, no longer exists, as the natives find that since the British rule came their way, their small wants in the shape of copper articles could be supplied by melting down the baser coinage of the Empress of India.

That the Madda Khel have an artistic sense is shown by their wood-carving, the doors of their better houses, and their charpoys (beds) being roughly carved out in strong patterns, the general effect resembling that of the ruder work of England in the early Middle Ages. The charpoys, unlike our idea of having the principal decoration at the head of the bed, are arranged like a settle, so as to form a comfortable seat with a handsome carved back-rest for day use.

Geologically the face of the country presented Eocene strata cut up by igneous rocks, with intervening plains formed apparently of recent alluvium, pointing to the former existence of large mountain lakes. These latter burst through their boundaries, their deposit being subsequently eroded by rivers boring channels, while the alluvial strata, except close by one side of the modern rivers, became covered by rocky detritus from the surrounding hills, forming a sloping surface towards the streams. The more rapid streams appear to have always maintained that nature since their formation, as alluvium does not exist in their course. The dried-up lakes through which they now flow, generally only after heavy rain, or the melting of the snow, present areas of large-stoned gravel, to mark their former sites. This gravel is frequently of a very solid nature owing to the amount of lime in which it was deposited. An excavation at Boia, which did not extend below twelve feet, as the shaft became flooded, gave recent shells to indicate the age of the deposit of the alluvium formed only near the large streams having a less precipitous fall.

The Eocene strata presented a mass of nummulitic limestones, much distorted, in the fork between the Kazha and the Tochi rivers. These limestones showed near their visible base a white foraminiferal limestone. At their top, in a hollow formed by the nummulitic strata, a patch preserved by its situation from denudation, of white sandstones and some clays, containing crystals of selenite, reminded one of somewhat similar formations near London. Unfortunately no fossils were observed in these sands and clays during the necessarily hasty search carried out during a march across these strata. Although other localities showed sandstones, shales, and limestones, no fossils were found to indicate the age of the strata. In this nummulitic region were found species of *Cerithium*, *Natica*, *Ostera (vesicularis?)*, and *Conus*, associated generally with Alveolinae.

The igneous rocks were almost invariably varieties of serpentine, generally of a dark bluish green variety. Chrysolite was met with, near which chromic iron ore also occurred. Sometimes the serpentine appeared as marmolite; frequently it was found with diallage, and also mixed with calcite. Limonite, talcose schist, magnesite, and a few other minerals were also observed.

Although the search for fossils became tedious from the monotony of want of success, the country appeared an interesting one, as presenting many excellent illustrations of processes of earth sculpture. Still, the piecing together of the distorted rocks would be a task requiring considerable time and skill; especially as many localities containing stratified rocks have not yielded fossil remains, while their relations to the nummulitic strata are disguised by belts of igneous rocks. It is hoped, however, that this sketch may prove of some interest, more especially when read in conjunction with the notes on the foraminifera of the region, which Mr. Earland has kindly appended.

London, 7th September, 1899.

FORAMINIFERA OF THE TOCHI VALLEY.

By Arthur Earland.

BY favour of Major B. M. Skinner, R.A.M.C., I have had an opportunity of examining the rock specimens which he collected in Waziristan during the recent North-West Frontier campaign, and mentioned in the preceding article. Considering the difficulties under which they were collected during an arduous campaign, many of them while actually on the march through the enemy's country, and the immense difficulty of transport in such a region, they form a proof of zeal and energy of which their collector may well be proud.

From a microscopical point of view the specimens are of great interest, for nearly all are Eocene limestones of foraminiferal origin. They vary considerably both in appearance and character, some being comparatively soft and easily broken, while others are wholly crystalline and capable of taking a marble-like polish. Nearly all the specimens abound in foraminifera, some being wholly composed of their tests cemented together by a matrix of foraminiferal debris.

As the materials are all too hard to be prepared in the customary manner, and no sections have as yet been cut, only such of the foraminifera can be identified as are visible with a lens on the surface of the specimens. The limestones fall naturally into two divisions. (1) Alveoline; (2) Nummulitic. This does not mean that the Alveoline specimens contain no Nummulites, or vice versa, but that one form predominates more or less to the exclusion of the other. The Alveoline specimens contain representatives both of the elongated forms, of which the type is *Alveolina boscii* of Defrance, and of the ovoid and spheroidal forms: type, *Alveolina melo* of Fichtel and Moll; but the latter predominate to the almost total exclusion of the former. The specimens are all of

that large size which characterises this foram in Eocene times. At the present day *Alveolina melo* is a small foram, rarely exceeding $\frac{1}{10}$ inch in diameter, nowhere very abundant, though with a wide distribution in shallow tropical seas. When these rocks were deposited it must have been by far the most abundant form of marine life over extensive areas of sea bottom, attaining the comparatively gigantic size of $\frac{1}{8}$ inch and

Amateur photo by *J. T. HOLDER.*

ALVEOLINA LIMESTONE (A. MELO) FROM INDIA × 8.

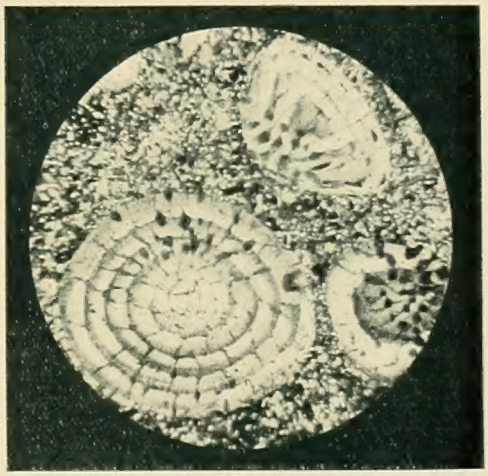
occasionally $\frac{1}{4}$ inch in diameter. The specimens of *Alveolina boscii* on the other hand are approximately of the same dimensions as recent examples, which abound in many shallow tropical seas.

Among the Nummulitic limestones the predominant species is *Nummulites laevigata* of Lamarck, a species with a world-wide distribution in Eocene times, and one which abounds in our own Bracklesham beds. The specimens as usual vary largely in size, but the majority are under $\frac{1}{2}$ inch in diameter. Associated with it, but in lesser numbers are *Nummulites complanata* Lamarck and *N. perforata* Montfort. The former is a flat discoidal form which reaches 1 to $1\frac{1}{2}$ inches in diameter. The latter is almost spheroidal and varies up to $\frac{3}{4}$ inch. The meaning of the specific term *perforata* is not obvious, unless perhaps Montfort described the form from specimens which had been pierced for use as beads, as the South Sea Islanders now pierce and use *Orbitolites complanata*. Perhaps some reader of SCIENCE-GOSSIP, with means of access to Montfort's original description, will settle this point.

Other foraminifera, which have been identified on the surface of Major Skinner's rock specimens are *Miliolina* sp., *Orbitolites* sp., *Rotalia* sp., and *Orbitoides* sp. The latter is fairly common in the Nummulitic rock specimens, but usually broken. *Truncatulina lobatula* W. and J. also appears adherent to a fragment of a bivalve shell. The list is short, but no doubt careful examination of sections would considerably increase it, although deposits such as these, in which one species largely predominates, seldom contain many other kinds.

I had also an opportunity of examining a series of rock specimens collected by Major Skinner during the same campaign in the neighbourhood to the east of Miramshah in the Tochi valley, but as they come from a locality untouched by his paper, they do not call for a detailed notice. They are chiefly Alveoline limestones in a highly crystalline form, with imbedded corals. Many of them are capable of being worked as ornamental marbles, of the most beautiful description. Indeed, as Major Skinner says, from the abundance of such building material, it should be a land of palaces instead of huts. Among the specimens I found one containing what I think is a dimorphous variety of *Alveolina melo*, which may call for further description. This foram came from near Kohat.

Another specimen of Major Skinner's, from the Sheranni Pass, deserves special mention. It is an oblong slab of limestone, about the size of a half brick. In this small thickness of deposit, the limestone had altered from Alveoline to Nummulitic, marking a



Amateur photo by *J. T. HOLDER.*

NUMMULITIC LIMESTONE FROM HINGARY × 8.

change in the conditions of life, probably due to a considerable variation in the depth of the sea, sufficient to bring about a radical alteration in the local fauna of the epoch.

28, *Glenwood Road, Catford.*

MICROSCOPICAL PREPARATIONS.—M. J. Tempère, of 168, Rue St. Antoine, Paris, publisher of the recently issued "Marine Diatoms of France" (S. G., Vol. vi., N.S., p. 120), has sent us his catalogue of microscopical preparations for 1900. This is the largest and best-arranged catalogue of its kind that we have seen. As might be expected, it is especially strong in Diatoms, but all other objects are well represented, and numerous lantern slides are also listed. The slides are priced at 1 fr. 25 (1s.) and upwards.

PLANT RECORDS FOR WELLS.

By James Saunders.

THE interesting note on the flowering plants of Hunstanton, that appeared in the September issue (ante p. 105) of Science-Gossip, from the pen of Mr. E. T. Mott, of Leicester, suggests that a similar list of those observed in the neighbourhood of Wells-next-the-Sea, also in the county of Norfolk, would be useful for comparison. They have a further interest, in that they serve as recent confirmations of former observations for the Watsonian vice-county 28-West Norfolk. They were published in "Watson's Topographical Botany" in 1883. There is at least one new county record, which is for the segregate *Ceratophyllum demursum* L. as Watson only gives the aggregate *C. aquaticum*, for both the vice-counties of Norfolk.

The most interesting localities that were visited during a brief holiday early in August last, were two sandy flats, that are apparently inundated in winter. These have their counterparts, on a much larger scale, at Braunton Burrows, N. Devon. The two now referred to are situated amongst the sand dunes, about midway between the entrance to Wells Harbour and Holkham Bay. They are on the seaward side of the pine trees which form so conspicuous a feature in the landscape. The situation is certainly a lonely one, for although three visits were made to the spot, just in the height of the holiday season, not a single traveller broke in upon the charming solitude, nor did even the ubiquitous keeper jar one's nerves with his unwelcome presence. Nevertheless within a mile of the spot there were on fine mornings, several hundreds of visitors, either disporting in the waves or sunning themselves on the sands. Hence, however accurately the locality may be described, there is little fear that its botanical treasures will be exterminated by greedy plant-hunters.

The smallest flower noticed on these sandy plateaux was *Erythrea pulchella* Fries. Of this there were thousands, averaging from an inch to two inches in height. One had the whole plant complete in about the dimensions of an ordinary pin. Roots, radical leaves, stem, calyx and rosy corollas, all were present, the last barely a quarter of an inch in diameter. Associated with these were a few plants of *E. centaurium* Pers., which in this instance differed so greatly from *E. pulchella* that they appear to deserve specific rank, although some authors consider them a sub-species of *E. centaurium*.

Another interesting species, that over a considerable area whitened the herbage with their cottony erect stems was *Gnaphalium luteoalbum* L. The flower heads are few and compacted at the top of the stem, and they are very glistening, especially in direct sunlight. The unusually simple habit of the plants under consideration induced me to forward specimens to the British Museum, and in acknowledging their receipt Mr. Britten remarked that this peculiarity distinguished them from any of their large series. The species is very limited in its distribution over England, having at present only been observed in Norfolk, Suffolk, and Sussex. Would not Lincolnshire botanists be well advised to search for it on the western shores of the Wash?

A diminutive *Euphrasia* was also present in abundance, but which of the recognised forms of this protean species it was, would require a specialist in this group to determine.

Of the genus *Statice*, which are truly littoral plants, two species were present, these being *S. auriculaefolia* Vahl. (*S. spathulata* Hook) in great abundance, and *S. bellidifolia* Gouan (*S. caspia* Willd.) in small quantities. The latter is another instance of a plant of very limited distribution, Norfolk, Suffolk and Cambridge, being the only counties given for it in Hooker's "Student's Flora," although Watson queries it for Lincoln South, and records it for Lincoln North, on the authority of "Bank's Herb." A recent record for Lincoln South is a desideratum.

Close by, or in a small brackish pool, between these two sandy plateaux, *Glaux maritima* L., *Scirpus lacustris* L., *Juncus compressus* Jacq., and the comparatively rare grass *Polypogon monspeliensis* Desf., grew in small quantities. On the seaward side of the sand dunes and also on the shore above high water mark, there were noticed sea holly, *Arenaria peploides* L., *Lactuca virosa* L., *Convolvulus soldanella* L., *Inula conyza* D.C. (ploughman's spikenard), *Filago minima Fr.*, *Salsola kali* L., *Triticum junceum* L., *T. pungens* R. and S., and *Psamma arenaria* R. and S. Another grass similar to the last-mentioned is worthy of special remark. This is *Elymus arenarius* L. A very large proportion of the fruiting stems of this species had been destroyed by smut. Probably not more than five per cent. had escaped the attacks of this micro-fungus. This grass is very useful in binding the loose sands of sea shores. It throws up many barren shoots, which are clothed with broad, glaucous green leaves. The peculiarity that most arrested my attention, was, that these barren stems were jointless and solid, at least so far as those portions above ground were concerned This is unusual, I think, amongst grasses, the leading character of which is, that they have hollow jointed stems. In *Elymus* this is so with the fruiting stems, but is not so with the barren. The sheaths of the leaves in both cases are split, which at once distinguishes it from the sedges. It is one of those plants showing the connecting links between allied genera.

The mud-flats to the east of Wells yielded the

species usually found in such situations on the east coast. The most conspicuous and also the most beautiful was the common sea lavender (*Statice limonium* L.) Many acres of ground were tinted with its blue-purple corollas. It was stated to the writer that artists frequently endeavour to reproduce on canvas the colour effects exhibited by these flowers. Associated with them were the more sober tinted plants of the goose-foot tribe. Amongst these may be specified *Atriplex littoralis* L., *A. portulacoides* L., the marsh samphires *Salicornia herbacea* L., also S. *radicans* Sm., and *Suaeda maritima* Dumorlt. Our visit was just at the time when it is customary to gather marsh samphire, or "sampher" of the natives, for culinary purposes. It was noticed that they were careful in their selection of the plants for this purpose. So far as one could see *S. radicans* was avoided, and it was locally called "sheep's sampher." To search these mud flats effectually, it is expedient to adopt the local method of traversing them, that is with bare feet. Attending this method is the great advantage of having dry foot-gear to don when leaving the marshes, the benefit of which is obvious.

On the waste ground to the east of the head of Wells Harbour, the most conspicuous plants were : *Beta maritima* L., the very local *Suaeda fruticosa* Forsk., and the curious grass *Lepturus filiformis* Trin. The last mentioned is so inconspicuous that the spot was passed over several times before it was observed. The salt water ditches near were crowded with *Scirpus maritimus* L. In the fresh-water dykes between Holkham and Wells there were noticed the usual plants of such situations. One need only mention *Potamogeton polygonifolius* Pourr., *Elodia canadensis* Michx., *Rumex hydrolapathum* Huds., *Sparganium ramosum* Huds., and *S. simplex* Huds.

Near Warham, about two miles east from Wel and not far from the excellently preserved Danish Camp, there flourished in a broad ditch the white water lily, and hornwort in fine fruit. Near the eastern end of the Wells golf links, the curio umbellifer, *Bupleurum tenuissimum* L., occurs small quantity by a little pool. Both this and its near ally *B. rotundifolium* L. have the perplexing habit of simulating *Euphorbia* in their inflorescence. Probably sufficient has been written in the foregoing brief account to show that the neighbourhood of Wells-next-the-Sea will well repay the efforts of an enthusiastic plant lover.

49, Rothesay Road, Luton.

RADIOGRAPHY.

By James Quick.

(*Continued from page* 136.)

We must now discuss more in detail the working parts of an X-Ray outfit. The four chief items comprising this are, (*a*) the induction coil, (*b*) the battery, (*c*) the X-Ray tube, and (*d*) the fluorescent screen. The size of an outfit is generally associated with the length of spark given by the induction coil. A 12-inch set, for instance, includes a coil giving a 12-inch spark, and so forth. Fig. 4 depicts a 4-inch set and shows the connections of the battery with the terminals of the primary coil of the induction coil, also those of the X-Ray tube with the secondary coil. The tube is shown arranged in a clip, for taking a radiograph of the object on the table.

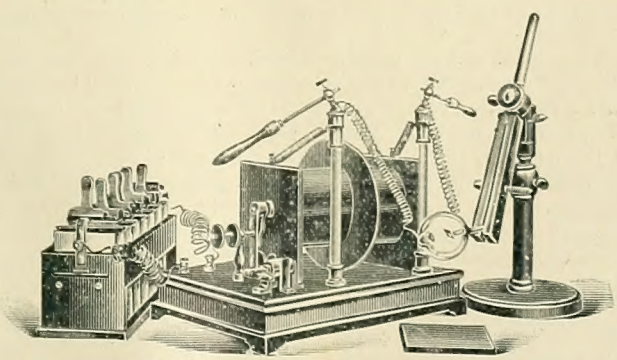


Fig. 4.—Apparatus arranged for taking a Radiograph.

This is a small set, and now very seldom used in hospital practice. The usual size for that purpose being a 10 to 16-inch. Coils giving up to 24-inch spark length, are sometimes used for special work.

Taking now each item separately and beginning with the induction coil, it will, perhaps, be useful to say a few words first upon its working principles and its construction. Suppose two coils, A and B, such as are shown in fig. 5, are taken, and the terminals of B connected to a galvanometer; if a current of electricity is sent through A, a momentary current will be induced in B, which will deflect the needle of the galvanometer. A is called the primary and B the secondary coil. Should the current in A be now stopped, a current will again be induced in B, but in the opposite direction, and the deflection of the needle will be the reverse of that in the first instance. If the circuit of A is made and broken quickly, there will be corresponding alternating currents momentarily induced in B, the smaller the time taken to actually make and break the circuit, the higher will be the

electromotive force produced. This is the principle upon which the induction coil works.

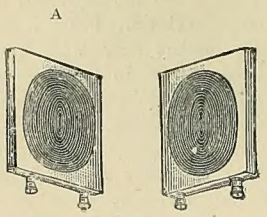


Fig. 5.—Pair of Demonstration Induction Coils.

Fig. 6 shows diagrammatically the construction and connections of a coil, which will perhaps render the following description clearer. Over a long bundle of soft iron wires T, T, is wound a helix of thick copper wire P, P, double cotton covered, forming the primary coil. Over this coil, but thoroughly insulated from it by a thick ebonite tube, is wound the secondary coil S, S, consisting of many miles of thin copper wire, single silk covered. No. 12 gauge wire is generally used for the former, No. 35 or 36 for the latter. The battery current enters at T_1, passes across B and H, flows through P, P, and returns to the battery via T_2. Immediately this takes place T,T, becomes strongly magnetised, H is attracted to T, and breaks contact at B. T,T, then, if of good soft iron is instantly demagnetised, H flies back and remakes contact—and so on.

t depends upon the length of spark the coil is to give, how the secondary is wound. Up to two or three inch spark length, it may take the form of one continuous coil from end to end, or perhaps in two sections. There is no gain in having more. The secondary of the coil in fig. 4 is wound in two sections, as is seen by the central partition. As the size of the coil increases and the electromotive force becomes higher, great care must be observed to prevent sparking inside; the secondary is therefore built up in a number of narrow sections—about three-sixteenths of an inch wide. Each is in a very thin ebonite cell, and these are threaded on the ebonite tube surrounding the primary. One end of each section is connected to the next, and so on to the outside sections when the final ends are taken out to the dischargers t, t—two insulated metal rods. Between these the secondary discharge takes place. In winding the sections the wire is constantly fed through a bath of melted paraffin wax.

The electromotive force of the induced secondary current increases, to a certain limit, with the number of turns upon the secondary coil, and as these are enormous it is possible to transform a low potential current flowing through the primary, to a very high potential at the secondary terminals. Now, as we have just seen, an induced electromotive force also depends upon the rapidity with which the current in the primary circuit is made and broken, and in an induction coil this is provided for by means of the contact-breaker B, H, which has recently taken various improved forms, as will be later described.

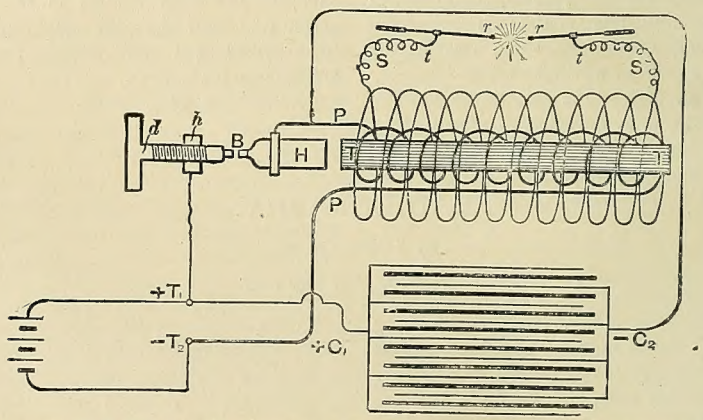


Fig. 6.—Diagram showing Construction of Small Induction Coil and Connections. (1.)

It is an essential point, then, for most X-Ray purposes that the time of break should be as short as possible, and anything that will conduce to this end will increase the efficiency of the coil. It is for this purpose that a condenser C_1 C_2, is connected between the ends of the contact-breaker, for since the spark, which is produced upon breaking such an inductive circuit as we are considering, would reduce the electromotive force of the secondary, owing to its prolonging the time of break, the condenser is inserted so that the energy of the spark is used up in charging it.

The most important points, therefore, to be considered for a good coil are: (1) an efficient contact-break, (2) thorough insulation of the secondary from the primary coil and also of any section from another, (3) a condenser of the right capacity. There is, apparently, no simple law for determining beforehand the best capacity a condenser should have for any one particular coil. Two coils of the same size, wound in the same manner, and with the same size and amount

(1.) The writer is indebted to the kindness of Messrs. Macmillan and Co. for the loan of fig. 6. It is taken from Wright's "Induction Coils."

of wire, may not give exactly similar results with condensers of equal capacities inserted. Manufacturers when testing a coil build up the capacity of the condenser to the best value for that one coil.

Sufficient has been said to show the importance of having a thoroughly constructed coil, for the strain put upon the insulation is very great at times, and once the secondary is broken down, the coil is almost useless. Even the quality of the wax used in the process of construction is an important matter. Some little time ago, the writer had to institute a whole series of experiments to discover why some coils refused to give their calculated spark lengths. It was quite two months before the cause was traced to some slightly inferior and soft paraffin wax having been used in the winding.

(To be continued.)

BUTTERFLIES OF THE PALAEARCTIC REGION.

By Henry Charles Lang, M.D., M.R.C.S., L.R.C.P. Lond.

(Continued from page 147.)

Genus 5. *HYPERMNESTRA* Mén.
Ismene Nick.

Wings not emarginate, somewhat rounded, of a pale yellow colour somewhat like that of *Thais cerisyi* ♂. Pattern of wings rather like that of *Parnassius*, with black and red spots. Sub-costal nervure of f.w. four-branched. Palpi and antennae as in *Parnassius*. No abdominal pouch in ♀.

1. **H. helios** Nick.

48—52 mm.

Wings in ♂ pale creamy yellow. F.w. with two black costal spots and external to these one large and two small red spots, placed one above the other, surrounded by a black edge and coalescent, apex

Hypermnestra helios ♂ *and* ♀.

blackish with white spots, reminding one of *Anthocharis*. H.w. with a very small central and costal red spot, two faint bands of greenish grey in the central and sub-marginal areas, base and ou. marg. narrowly black. ♀ larger and more strongly marked; ground colour, generally deeper than in ♂. F.w. with a distinct black spot near centre of inner marg. U.s. f.w. as above but lighter, h.w. marbled with light green and white.

Hab., the Steppe lands of Turkestan, N. Persia, Sea of Aral, Tekke. IV., V.

Larva. "Thick, very like that of *P. machaon*, light green." R. and H. On *Zygophyllum turcomanicum*. IV. e. Pupa is said to be buried in the ground.

a. var. *maxima* Stgr. 56 mm. A larger and more brightly marked form. Hab., Turkestan.

b. ab. *ochraceomaculata* Grum. An aberration with yellowish spots in place of red. Hab., Steppes in the neighbourhood of Bokhara. IV.

Genus 6. *DORITIS*, O.

Antennae rather short with a recurved club. Palpi short and hairy. F.w. with sub-costal nervure

Doritis apollinus var. *bellargus*.

5-branched. Female without abdominal pouch. Wings not white, but f.w. semi-transparent. This remarkable and beautiful genus contains but one species, it is quite distinct from *Parnassius* and is limited to Asia Minor and Syria. Possibly it may be found in European Turkey and the Greek Islands. It is figured by Hoffmann as European.

1. **D. apollinus** Herbst. Lg. B.E., p., 14, pl. III., fig. 6.

50—62 mm.

Wings with margins entire. F.w. grey or yellowish grey, semi-transparent, marked with fine black lines, two large black spots at costa, and a third near apex, internal to the last a triple red spot as in *H. helios*

but fainter, a sub-marginal row of black spots. H.w. pale yellow, more opaque, ou. marg. grey, semi-transparent, internal to this a row of black spots with blue centres and surmounted by red lunules; base black.

♀ somewhat larger than ♂, and with a red spot towards in. marg. of f.w.

HAB., Asia Minor, Syria, Mesopotamia, Taurus. ? The Greek Islands. Turkey. II.—IV.

LARVA, "Black with two rows of red spots on each side, between which on the middle segment are a row of six red spots. Cylindrical, clothed with short hairs." Kindermann. On *Aristolochia hastata*. IV. PUPA under moss and stones.

a. var. *apollinaris* Stgr. in litt. A small pale form with smaller spots on h.w. HAB., Armenia, Asia Minor; in elevated positions.

b. var. *bellargus* Stgr. in litt. A darker form with broad band on hind wings, the red and black spots being very large with blue centres. HAB., Antioch.

c. var. *mardina* Stgr. A small form. ♂ paler and less strongly marked than type. ♀ with bases of h.w. reddish. HAB., Mesopotamia.

a. ab. *rubra* Stgr. ♀ with h.w. strongly marked with red, especially at base. HAB., Aintab.

e. var. *krystallina* Schilde. Wings unicolorous grey, h.w. with a red spot powdered with yellow at int. ang. HAB., Asia Minor.

GENUS 7. *PARNASSIUS* LAT.

The sub-costal nervure is four branched. Antennae short with an ovoid or elongated club not curved. Wings with ou. marg. entire, rounded; h.w. concave at in. marg, usually the f.w. are subdiaphanous toward the apices and along ou. mar. Body and bases of wings hairy.

FEMALE with an abdominal pouch.

Larva cylindrical, smooth or slightly pubescent with Y-shaped post-cephalic tentacles. They feed on Saxifragaceae and Crassulaceae.

Pupa, spun up in a rudimentary cocoon.

The butterflies of this genus are generally of moderate size, but sometimes large—33 mm. (*P. simonius*)—95 mm. (*P. hesebolus*). The Palaearctic species have the wings white, with black spots, which have the following general arrangement:—The f.w. have always at least two sub-costal spots placed in the discoidal cell, very often there are one or two external to these, and one near the centre of in. marg. The inner marginal and external sub-costal spots are frequently marked with red, very conspicuously so in some species, as in *P. insignis*, *P. apollonius*, etc. The h.w. have the bases black, and always have two conspicuous marks, one on the costa and one near the centre, between the disc. cell and ou. marg. These last markings generally consist of black rings enclosing a brilliant red spot, which often has a white centre. In some cases there is a sub-marginal band of black spots with blue centres, something like those seen in *Doritis apollinus*.

Only two Palaearctic species present exceptions to the general rule of pattern and coloration. The first is *Parnassius eversmanni*, in which the male has the ground colour of the wings bright yellow. The second is *P. stubbenaorfii*, in which the spots are absent from the wings entirely, producing a striking superficial resemblance to the black-veined white butterfly (*Aporia crataegi*), one of the Pieridae.

The genus *Parnassius* is exceedingly interesting as an object of study; not only on account of the great beauty of the design and coloration, but from its affinity to the neighbouring genera, from which, however, it is very evidently separated. There is a great unity of type throughout the species, but the genus is divisible into several distinct groups, as will appear below. *P. apollo* is undoubtedly the type of the genus, being described by Linnaeus in 1758. This is one of the three European species, well known to every collector in Continental Alpine districts. The majority of species, however, occur in the high mountains, and on the steppes of Central Asia. New species are being almost annually discovered, as a consequence of increasing explorations in the regions of their habitat. Only those species will be described here that belong to the Palaearctic Region, but there are a few more which inhabit the adjoining Indo-Australian Region, and some occur in the Rocky Mountains, and elsewhere in North America.

The genus *Parnassius* has until comparatively recent years been but little known or understood. During the eighteenth century but three species were known. Linnaeus (Syst. Nat. X.) 1758, described two, *P. apollo* and *P. mnemosyne*. In 1790 Esper differentiated *P. delius* from *P. apollo*, with which, no doubt, it had previously been included. These, the three European species, were all that were known up to 1823, probably owing to the disturbed condition of Europe, and the difficulties of travel. In the first half of the nineteenth century many additions were made from 1823 to 1851. Eversmann, Ménétriès and Nordmann added to the list several Siberian and Central Asian species; *P. nomion*, *P. corybas*, *P. apollonius*, *P. actius*, *P. delphius*, *P. tenedius*, *P. clarius* and *P. stubbendorfii*.

In 1855 Ménétriès proposed an arrangement of the genus into sections, the basis of classification being the arrangement of the red markings.

1st Division. With red basal spots on the underside of hind wings; *apollo*, v. *hesebolus*, *apollonius*, *nomion*, *phoebus* Prun. (*delius* Esp.), *sedakovii*, *intermedius*, *clodius*, *eversmanni*, *wosnesenskii*. *Actius* and *delphius* Ev. 1846, are not included in this list.

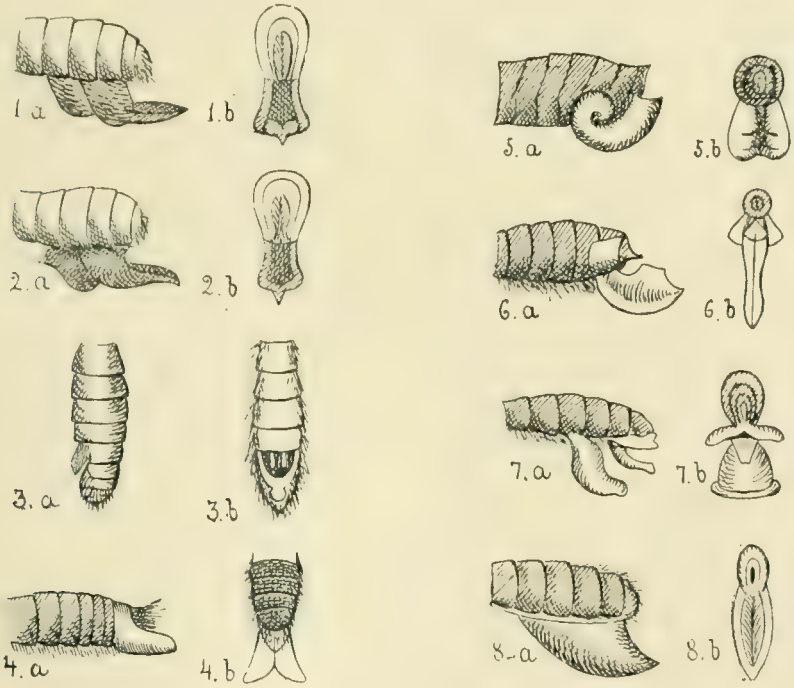
2nd Division. No red basal spots on underside of hind wings. *Clarius* and *nordmanni*.

3rd Division. No red spots on any of the wings. *Mnemosyne*, *stubbendorfii*.

This arrangement, which was founded merely on markings and coloration, was, in spite of its bringing together in the first group forms widely separated, sufficient for the needs of the time. Several other species were afterwards described by Ménétriès and Bremer, and by the time Dr. Staudinger published the second edition of his catalogue in 1871, fourteen Palaearctic species were enumerated, exclusive of

varieties and aberrations, under which head many of those formerly considered species were classed.

The first really important effort to elucidate the genus was made by Mr. H. J. Elwes in the Proceedings of the Zoological Society, 1886, pp. 6—53. In this monograph the writer bases his arrangement upon a better character than that used previously by Ménétriès, namely, upon the abdominal pouch in the females. This though admittedly a physiological rather than a strictly anatomical character, seems to be a perfectly sound one upon which to group the genus. The horny pouch in the female is demonstrated from practical observations to be found only



Abdominal Pouches of Female Parnassius.

I. Carinati. Figs. 1*a*-1*b*, *apollo*; Figs. 2*a*-2*b*, *discobalus*.
II. Valvati. Figs. 3*a*-3*b*, *simonius*.
III. Cincti. Figs. 4*a*-4*b*, *delphius*.
IV. Cornuti. Figs. 5*a*-5*b*, *charltonius*.
V. Scapulati. Figs. 6*a*-6*b*, *szechenyi*.
VI. Limbati. Figs. 7*a*-7*b*, *tenedius*.
VII. Venticosi. Figs. 8*a*-8*b*, *stubbendorfii*.

in the impregnated female, and to be formed of secretion by the male. Yet, it possesses several widely diversified, but constant formations.

Upon the formation of the abdominal pouch a classification is based by Austaut in his valuable and painstaking work "Les Parnassiens de la Faune Paléarctique" Leipzic, 1889.

The following is his system of grouping :—

1. Group Cornuti. Pouch rolled upon itself, without keel or appendix; but on the contrary with a large though not deep, central furrow. Antennae black. One species, *P. charltonius*.

2. Group Cincti. Horny pouch disposed in a ring completely enveloping the abdomen and prolonged beneath into a bifid lobe. Antennae black. 5 species, *P. namanganus*, *P. delphius*, *P. transiens*, *P. staudingeri*, *P. cardinal*.

3. Group Carinati. Horny pouch laterally depressed, furnished at its anterior part with a strongly marked ridge and at its posterior part, with prominent horizontal lamina pointed or rounded. Antennae sometimes ringed with white. 11 species, *P. apollo*, *P. nomion*, *P. actius*, *P. romanovi*, *P. rhodius*, *P. insignis*, *P. discobalus*, *P. delius*, *P. honrattii*, *P. bremeri*, *P. apollonius*.

Group 4. Limbati.—Pouch very large, rounded, without ridge, but overlapped above by a bilobate process. Antennae black. 1 species—*P. tenedius*.

Group 5. Venticosi Aust.—Pouch white, very large, without any ridge or appendages. Antennae black. 6 species, *P. eversmanni*, *P. felderi*, *P. clarius*, *P. nordmanni*, *P. mnemosyne*, *P. stubbendorfii*.

Group 6. Valvati Aust. Parnass. p. 187.—Pouch very small and incompletely developed. This section is formed for *P. simo* and the var. *simonius*.

Group 7. Scapulati Aust.—Pouch white, very large, but flattened laterally, and enveloping more completely the extremity of the abdomen. Clubs of antennae elongated. This name is applied by Austaut to two recently discovered species *P. orleans*, Oberth, and *P. szechenyi* Friv. in "La Naturaliste."

I make use of Austaut's method of grouping, but in following order :—1 carinati, 2. valvati, 3. cincti, 4. cornuti, 5. scapulati, 6, limbati, 7. venticosi.

(To be continued.)

ON COLOURING OF BIRDS' EGGS.

By Reginald J. Hughes.

THE cause of the various colours of birds' eggs has not yet been satisfactorily explained; in fact, the only attempt to do so, deserving serious notice, is that which considers their tints due to protective colouration. This idea, however, hardly bears examination. What is there protective, for instance, in the colouring of the bright blue eggs of the hedge sparrow or the thrush? Even the white eggs spotted with red, of which there are so many, such as those of the robin, can scarcely be said to be difficult to see in the nest. Again, the eggs of sea-birds do not always harmonise with the colour of the cliff where they are placed. It is, indeed, much more important that the colour of the hen bird should be protective than that of the eggs which she usually covers during incubation. A good example of protective colouring of the bird is seen in the case of one of the few British birds with green plumage, viz., the golden-crested wren. This bird usually lives in Scotch fir and spruce fir trees, where, as the leaves do not fall off in winter, a green colouring is more useful than the brown of most English birds that live in deciduous trees. Yet, its eggs are not at all inconspicuous, being white, spotted red. Of course I do not deny that there are some cases of protective colouring; for instance, the cuckoo, and some birds that lay ground-coloured eggs in an open nest on the ground.

In the present article I intend to consider the colouring on birds' eggs as a convenient way of getting rid of some superfluous elements in their blood, and I think I shall be able to show a connection between the colours of birds and their food taken during winter and early spring. We will generally take British birds as examples, because I, and probably most of your readers, have a better practical acquaintance with them, than with those birds not occurring as breeders in these islands.

I shall, for my purpose, divide our birds into five classes, according to their food, viz. :—

1. Birds whose food largely consists of insects that feed on vegetable matter.

2. Those birds feeding chiefly on fruit, berries and seeds.

3. Sea-birds subsisting on fishes and other marine animals.

4. Birds living on miscellaneous food, such as freshwater fish, carrion and offal, amphibians, etc.

5. Birds of prey.

I propose to show that each of the above classes produces eggs of a characteristic colour. As examples of the first class, I will enumerate the robin, blackcap, golden-crested wren, willow wren, grasshopper warbler, common wren, tree-creeper, the familiar Paridae, Motacillidae, and Anthidae. It will be found that the eggs of all these have a white, or in some cases reddish, ground colour, spotted or blotched with red or brown. Now I am of the opinion that carbonate of iron is the principal cause of this red-brown colour. This forms the pigment in the feathers and on the eggs of the buff breeds of domestic poultry, which lay brown eggs. The administration of small doses of carbonate of iron has been found to darken both eggs and plumage of fowls. In order to test the truth of this suggestion, I extracted the pigment from some eggs of this class by rubbing them in warm water with a piece of white satin. This is the best material for the purpose, because it is the easiest substance from which to squeeze the colour. On evaporating the water I obtained a small quantity of colouring matter, tolerably free from the lime of the shell. When dried and heated, it burnt with the usual flame of carbon, although it often disappeared without any flame. The residue seemed to be composed of lime, soot, and some small reddish specks that were attracted by a magnet. I have never found this colouring matter to be capable of attraction before being burnt. Now this is exactly how desiccated carbonate of iron acts when burnt. Before combustion it cannot be affected by a magnet, but afterwards is easily attracted. Vegetable-feeding insects are obviously a likely source from whence birds might derive carbon.

My Class 2, birds feeding largely on seeds and berries during winter, contains the song thrush, fieldfare, blackbird, linnet, brambling, hawfinch, greenfinch, bullfinch, and many others that have the ground colour of the eggs varying from green to blue, generally blue-green. I consider the pigment to be probably some kind of hydro-carbon. The fact that these eggs lose their colour if left long in a strong light, and also if heated, agrees with this conclusion. The colour is very much akin to that which causes the green colour of caterpillars, and the necessary elements are the most common constituents of fruit and seeds. The colour is very difficult to extract from eggs of this class, the shell invariably breaking during the process. It may be argued that fruit is as likely a source of carbonate of iron as insects. To this I agree, and that is the reason why most of the eggs of birds in this class are spotted red or brown. It cannot at present be explained why some should be spotted and others not, such as the eggs of the hedge sparrow, which are spotless. Possibly the colouring matter is sometimes all taken up by the plumage, where it is more useful for protective purposes, when used in that manner. Some of the sea-birds are good examples of this point, as will be seen later. It might be thought domestic fowls' eggs belong to this class, as fowls feed largely on seeds, but probably the green colour is used up by the feathers. Many birds with the bluest eggs eat a considerable number of worms, snails and slugs, which food may

also have something to do with the colour. It may be noted that the stonechat and whinchat, which feed chiefly on worms, have bluish green eggs. It seems that vegetable matter and worms supply more carbon and hydrogen than insects, and the latter more iron. There are many birds that eat largely of insects, seeds, and worms, whose eggs are midway in colour between those of classes 1 and 2, the eggs being usually light green or blue, and spotted, the family Alaudidae being a good example.

We now come to Class 3, the sea-birds, and these may be divided into three sections, according to the colour of their eggs: (*a*) those which lay buff or stone-coloured eggs, with often darker blotches; (*b*) those with white eggs; and (*c*) with greenish eggs, often with dark markings.

In the first section (*a*) are the gulls, most terns, divers, the turnstone, oyster catchers, and many others. This colour of the eggs is probably due to a deposit of chloride of iron. The chlorine is certainly a very likely waste product from a diet of fish. Why some sea-birds should lay buff or stone-coloured, and others white eggs, is rather a difficult question to answer. It may be noted, however, that most of those species which lay white eggs have dark plumage, such as the petrels and shearwaters. These being nocturnal, or, at least crepuscular in habits, the dark pigment is more useful in the plumage to render its wearers inconspicuous, than it would be on the eggs.

The green colour of some sea-birds' eggs (*b*) is very different to that of Class 2. I have never known it to fade in the light, and it takes much more heat to destroy. It certainly contains sulphur, a kind of sulphide of iron, allied to "green vitriol." It will be found that if a thick shelled egg, which will not easily crack, such as a guillemot's, is heated by a spirit lamp or candle flame, it gives out an unmistakable smell of sulphur, quite different to the smell of the other classes of eggs when similarly treated.

The eggs (*c*) of the stone petrel, Wilson's petrel, forked-tailed petrel and fulmar, form a very interesting exception to the general colouration of sea birds' eggs, as they are white spotted with red. It will be found that these birds are very fond of eating any fatty matter they find floating on the water. I believe this to be another case of carbonate of iron, the carbon being derived from the fat. The three petrels are also nocturnal dark-coloured birds, which accounts for the white ground colour of the eggs.

The 4th class is a miscellaneous group of birds feeding on various substances containing little of the elements that go to form the pigments of eggs, such as fish and other animals inhabiting fresh water; so their eggs are naturally white. Among these are the dipper, kingfisher, little bittern, little grebe, red-necked grebe, and the families Strigidae, Vulturidae, etc. The Egyptian vulture is about the only one of its family whose eggs are always marked with reddish spots, but it feeds largely on vegetable refuse.

The 5th class, the family Falconidae, forms really an exception to the last one, as its members feed on other birds and small mammals. Yet, most of their eggs are spotted or stained red, a pigment very difficult to rub off, and quite different to that of the first class. I believe the red colour to be simply an oxide of iron, very likely the result of their diet.

In conclusion, it will be seen that I have considered most of the colours of eggs to be caused by the union of the iron in the birds' blood, with extraneous matters also present. They may all be said to be derived from impure haemeoglobin. I will here draw attention to the fact that though the eggs of allied genera are usually similarly coloured, yet this is generally because such allied birds have similar foods, such as the tits and finches. Where there is a difference of food, even in closely-connected species, the colouring of the eggs is different. For instance, among the Turdinae, those birds which eat chiefly seed, fruit, worms and snails, such as the blackbird and stonechat, have blue eggs, while those that feed chiefly on insects have white eggs, spotted red, such as the robin. The terns are a very striking example of this theory; they can be divided into two classes, those feeding on land insects, fresh-water fish, vegetable matter, worms, or amphibians, and those which eat marine fish. In the first class are the black tern, white-winged black tern, whiskered tern and gull-billed tern. In the second are the Caspian tern, Sandwich tern, roseate tern, common tern, little tern, sooty tern, and noddy tern. It will be found that the eggs of all in the first-class are greenish marked with brown, and in the second section, stone coloured or buff.

I think the subject of this article forms a good field for future research. I have merely tried to point the way.

Norman Court, Southsea,
September 30th, 1899.

GRESHAM COLLEGE LECTURES.—On November 14th, 15th, 16th and 17th, the Rev. Professor Edmund Ledger, M.A., F.R.A.S., is intending to continue his course of lectures on sidereal astronomy. The lectures are delivered at the college in Basinghall Street, from 6 to 7 p.m., are illustrated with the limelight, and are free.

NEWMANN'S PUBLICATIONS. We have received a parcel of the publications issued by Messrs. Newmann and Co., of 84, Newman Street. London, W. Among them are new editions with coloured plates of Slack's "Marvels of Pond Life," "Beautiful Butterflies," by H. G. Adams, the Rev. W. Haughton's "Sketches of British Insects" and the same author's "Country Walks of a Naturalist with his Children." The last three of these books will be attractive to young people, on account of the brilliancy of their coloured plates, and will be useful in forming a taste for nature's beauties. With regard to the work on Pond Life, there is no better published, and for years past it has been the joy of young microscopists. Newmann's "Hygiene for the School and Home," by H. Major, B.Sc., is a valuable elementary work for teachers in instructing the young upon the fundamental structure of the body, the treatment of accidental injuries, and other useful knowledge so necessary for the maintenance of a thoroughly healthy constitution. "Hand and Eye" is the firm's monthly magazine on kindergarten work.

ARMATURE OF HELICOID LANDSHELLS.

By G. K. Gude, F.Z.S.

(*Concluded from page* 149.)

WITH regard to the geographical distribution, as far as our present knowledge enables us to udge, the genus is confined to Sikkim, Assam, Further India and China, extending south to Tenasserim, north as far as Central China, west to Sikkim, and east to Tonkin, with two outlying groups : one in the southern extremity of the Indian Peninsula and Ceylon, the other in the Philippine Islands.

On looking at the accompanying map, where I have ndicated all the known species at their respective habitats, some curious and striking facts in the distribution of the genus *Plectopylis* become apparent. It will be seen that the centre of distribution appears to be Lower Burma, especially Pegu and Tenasserim ; while no species occur to the south-east, the whole of Siam and Cochin China being blanks. Going east the Burmese Shan States and Laos each possess one species, *P. shanensis* and *P. laomontana* respectively, while Tonkin has eight. Upper Burma contributes one species from the Bhamo district, *P. andersoni*, one from Munipur, *P. munipurensis*, and three species in the south, i.e., *P. perarcta*, *P. ponsonbyi*, and *P. woodthorpei*. Assam has fourteen species. Going west we find another blank till we reach Sikkim, the western limit of the genus, where there are five species. The intervening country, Bhutan, has scarcely been explored, but Lieut.-Col. Godwin-Austen, the only naturalist, I believe, who has traversed this region, informs me he collected forms of *Plectopylis* there, but I have not yet been able to inspect them. Crossing the Himalayan Range we find one species in Eastern Tibet, *P. alphonsi*, while China, including Hongkong, has no less than seventeen species. A wide gap separates the Sikkim forms from the South Indian and the Cingalese species, a fact which will be less surprising, if, as I suspect, the latter prove to belong to a distinct genus. In all probability further

Map, showing Distribution of Genus Plectopylis.

exploration will bring to light many additional species, and possibly both Siam and Cochin China will, when they are searched diligently, be found to possess some interesting forms of the genus.

On page 149 I stated that no fossil forms of Plectopylis are known. I omitted to mention, however, that Dr. Stoliczka described three species of fossil Helices, which he referred to the section Anchistoma =Gonostoma, stating that they had affinity with *Plectopylis* and *Corilla*. (Cretaceous Fauna of Southern India, II., p. 9 *et. seq.*). Mr. Nevill, who examined these fossil shells, on the other hand, was of opinion that their appearance did not warrant this theory. (Journ. Asiat. Soc. Beng. L., 1881, p. 128).

I append a key to the species which I venture to hope will prove serviceable ; and, for convenience of reference, I have added an inde

I. Section ENDOTHYRA.

A. Palatal folds in one series.
- a. Shell 14-15 m.m. horizontal fold below parietal plate .. .. *pinacis.*
- b. Shell not exceeding 9 m.m. horizontal fold absent .. .. *sowerbyi.*

B. Palatal folds in two series.
- a. Parietal plate without denticles .. *fultoni*
- b. Parietal plate with one denticle posteriorly .. .. *macromphalus.*
- c. Parietal plate with two denticles posteriorly.
  - α. Shell not exceeding 6 m.m.
    - ° One upper and one basal palatal fold.
      - + A short horizontal fold above parietal plate .. .. *blanda.*
      - ++ horizontal fold none .. .. *minor.*
    - °° Only one basal palatal fold .. *hanleyi.*
  - β. shell 8-10 m.m.
    - ° Parietal plate gives off anteriorly a horizontal fold from upper extremity; one short horizontal fold below .. *plectostoma.*
    - °° No horizontal fold proceeding from parietal plate; two short horizontal folds below.. .. .. *affinis.*

II. Section CHERSAECIA.

1. DEXTRAL.

A. Transverse parietal plate simple.
- a. Free horizontal parietal folds none.
  - α. Palatal folds *six*.
    - ° Connected by a transverse ridge; shell 27 m.m. .. .. *oglei.*
    - °° Not connected; shell 24-26 m.m. . *andersoni.*
  - β. Palatal folds *five*; shell 11 m.m. .. *serica.*
  - γ. Palatal folds *seven* with two denticles *laomontana.*
- b. A free interrupted horizontal fold in front of parietal plate; palatal folds *six*, four inner united by a vertical ridge, seven denticles posteriorly .. .. .. *austeni.*

B. Transverse parietal plate giving off anteriorly *above* a *short* horizontal fold, with a denticle below plate. Palatal folds *six*; shell 10-11 m.m. .. .. *munipurensis.*

C. Transverse parietal plate giving off anteriorily *below* a *long* horizontal fold.
- a. With a median horizontal fold *continuous* to the peristome; shell 20 m.m. .. *brachydiscus.*
- b. With a median horizontal fold *interrupted*; shell 16 m.m. .. . .. *dextrorsa.*

2. SINISTRAL.

Parietal plate simple.
- a. Horizontal fold below transverse parietal plate, *short*.
  - α. No median fold .. .. .. *muspratti.*
  - β. A long median fold present.
    - ° A third short horizontal fold between upper and lower parietal folds.
      - + Palatal folds, all horizontal, shell 10 m.m. .. .. *perarcta.*
      - ++ Palatal folds, one vertical, rest horizontal; shell 7.5 m.m. . . *shiroiensis.*
    - °° No third fold present .. .. *nagaensis.*
- b. Horizontal fold below transverse parietal plate long, joined to apertural ridge *perrierae.*
- c. Three short horizontal folds in front of transverse parietal plate, none below it *refuga.*

B. Transverse parietal plate giving off anteriorly below a short horizontal fold; a long median and a long lower fold present, joined to apertural ridge.
- a. Palatal folds: all horizontal .. .. *shanensis.*
- b. Palatal folds: one oblique, rest horizontal
  - α. Parietal plate *rounded* in outline .. *leiophis.*
  - β. Parietal plate *toothed* in outline .. *pseudophis.*

C. Transverse parietal plate giving off anteriorily below a short horizontal fold, two short free horizontal folds above the latter, and a long one below joining the apertural ridge.. .. .. *brahma.*

III. Section ENDOPLON.

A. Shell flattened.
- a. Armature unknown .. .. .. *phlyaria.*
- b. Two vertical parietal plates .. .. *brachyplecta.*
- c. One vertical parietal plate with two denticles in front .. .. *smithiana.*

B. Shell with more or less conical spire.
- a. One transverse parietal plate.
  - α. One denticle in front of parietal plate.
    - ° Parietal plate rounded in outline; shell not exceeding 26 m.m. .. . *schlumbergeri*
    - °° Parietal plate toothed in outline; shell, 30 m.m. .. .. *jovia.*
  - β. Two denticles in front of parietal plate .. .. *villedaryi.*
- b. Two transverse parietal plates.
  - α. One horizontal parietal fold.
    - ° above anterior plate .. .. .. *giardi.*
    - °° below both plates .. .. .. *congesta*
  - β. Two horizontal parietal folds, one above, one below, the latter joined to the two transverse plates .. .. .. *françoisi.*

IV. Section PLECTOPYLIS, S.S.

A. Two transverse parietal plates.
- a. Parietal plates parallel; upper horizontal palatal fold bisected. Shell less than 20 m.m.
  - α. Median parietal fold truncate, not joined to apertural ridge .. .. .. *ponsonbyi.*
  - β. Median parietal fold not truncate, joined to apertural ridge .. .. .. *lissochlamys.*
- b. Parietal plates divergent; upper horizontal palatal fold not bisected. Shell more than 20 m.m. .. .. *magna.*
- c. Anterior parietal plate giving off a long horizontal fold above, and
  - α. A short one below, half the length of upper; palatal folds in two series .. *woodthorpei*
  - β. Lower fold one-quarter of the length of upper; palatal folds in one series .. *leucochila.*

B. Three transverse parietal plates.. .. *feddeni.*

C. Parietal plate ramified.
- a. Shell acutely keeled. Parietal fold trifurcate; a short horizontal fold near aperture .. .. *cyclaspis.*
- b. Shell not keeled. Parietal fold trifurcate.
  - α. No horizontal fold below parietal plate, a free interrupted horizontal fold in front .. .. *cairnsi.*
  - β. Parietal fold giving off anteriorly an interrupted horizontal fold; a short horizontal fold below plate .. .. *linterae.*
  - γ. Parietal fold giving off anteriorly a continuous fold
    - ° Shell thin .. .. *karenorum.*
    - °° Shell thick.
      - + Upper arm of parietal fold longest, lower horizontal fold united to apertural ridge .. .. .. *repercussa.*
      - ++ Lower arm longest, lower horizontal fold not united to apertural ridge.
        - ≀ Whorls much flattened, umbilicus very shallow .. .. .. *anguina.*
        - ≀≀ Whorls less flattened, umbilicus deeper .. .. *achatina.*

V. Section SINICOLA.

A. Armature unknown .. .. *jugatoria.*
alphonsi.
vallata.

B. Two transverse parietal plates.
a. Shell 6 m.m... ... . *diptychia.*
b. Shell 16 m.m. .. .. *biforis.*

C. One transverse parietal plate.
a. Parietal denticles or folds none.
α. Palatal folds in one series, parietal horizontal fold at aperture.
* Shell 6.5 m.m. .. .. *invia.*
** Shell 9 m.m. .. .. *secura.*
β. Palatal folds in two series .. .. *schistoptychia.*
No horizontal fold at aperture.
b. Two parietal denticles anterior to transverse plate.
α. Whorls angular or keeled, palatal folds six.
* Whorls $4\frac{1}{2}$, shell not exceeding 7 mm. *emoriens.*
** Whorls 6.
† Shell 15 m.m... .. .. .. *fimbriosa.*
†† Shell 12 m.m. .. .. .. *azona.*
β. Whorls rounded, palatal folds 7 .. *pulvinaris.*
c. Two parietal denticles posterior to transverse plate .. .. *cutisculpta.*
d. One or two horizontal folds in front of parietal plate.
α. Shell acutely keeled, umbilicus moderately deep; two vertical denticles between folds .. .. *reserata.*
β. Shell angulated, umbilicus very deep; one horizontal denticle between folds .. *laminifera.*
e. Two short horizontal folds in front of parietal plate, with one to four denticles between.
α. Shell conical above, $6\frac{1}{2}$—7 whorls.
* Whorls rounded .. .. .. *stenochila.*
** Whorls keeled .. .. .. v. *basilia.*
β. Shell depressed, $5\frac{1}{2}$—6 whorls .. *murata.*
f. One short horizontal fold above, with four or five denticles below, in front of parietal plate; shell shining. pellucid .. *multispira.*

VI. Section ENTEROPLAX.

A. Palatal folds: *four.*
a. Horizontal parietal folds united by a vertical ridge posteriorly .. .. .. *quadrasi.*
b. Parietal folds not united .. .. ..
α. Umbilicus moderate .. .. .. *trochospira.*
β. Umbilicus narrower .. .. .. v. *boholensis.*
B. Palatal folds: *ten* .. .. *polyptychia.*

VII. Section SYKESIA.

A. *One* transverse parietal fold.
a. Notched about the middle, a short support posteriorly above. Ceylon.
α. Umbilicus wide ribs and lyrae prominent .. .. *clathratula.*
β. Umbilicus narrower ribs and lyrae obsolete .. .. v. *comprcssa.*
b. Not notched.
α. Straight, without support, umbilicus still narrower. Habitat, India .. .. *clathratuloides.*
β. Sinuous, with a short support anteriorly above; umbilicus still narrower, Habitat, India .. .. *retifera.*

B. *Two* transverse parietal plates.
a. Shell flattened, no fold below umbilical angulation, umbilicus still narrower, Habitat, Ceylon .. .. *caliginosa.*
b. Shell conoid, with a double fringe of curved hairs; a horizontal fold below umbilical angulation; umbilicus still narrower. Narrowest of all. Hab., Ceylon *biciliata.*

INDEX TO PLECTOPYLIS.

The roman figures after the names indicate the volume of SCIENCE-GOSSIP New Series, page is in ordinary type, and number of figure is in italic type.

In concluding this consideration of the genus *Plectopylis*, I desire to acknowledge my indebtedness to many friends and correspondents without whose ungrudging assistance I could not have proceeded with the task. To Mr. Ponsonby I owe an irredeemable debt of gratitude, for in addition to valuable advice and suggestions, he has placed his unrivalled collection at my disposal. Lieut.-Col. Godwin-Austen, Mr. Edgar Smith, and Mr. S. F. Harmer have also placed me under deep obligation; the first-named communicated undescribed material, and all have allowed me access to type specimens. Miss Linter has very obligingly presented me with a series of shells, some of which proved to be new, while finally—for the loan of specimens from their collections, or from collections under their charge—I have to thank Prof. Boettger, Col. Beddome, the Rev. R. A. Bullen, Mr. W. T. Blanford, Mr. Robert Cairns, Mr. W. E. Collinge, the Rev. Vincenz Gredler, Mr. H. Fulton, Dr. H. Fischer, Prof. Giard, Mr. E. L. Layard, Mr. Jules Mabille, Prof. von Martens, Dr. von Möllendorff, Dr. F. J. H. Merrill, Mr. E. R. Sykes, and Mr. G. B. Sowerby. To the Editor of SCIENCE GOSSIP, I am also greatly indebted for his unremitting courtesy, attention to details, and for affording space in the pages of this Magazine, frequently, I fear, to the exclusion of matter more interesting to the general readers.

Adelaide Road, London, N.W.
2nd September, 1899.

BRITISH FRESHWATER MITES.

By CHARLES D. SOAR, F.R.M.S.

(*Continued from page 139.*)

GENUS *OXUS* KRAMER, 1877.

THIS genus at present is represented by two species in Britain, the same two forms which Piersig figures and describes as occurring in Germany.

The characteristics of the preceding genus apply to this, with the difference that body is depressed, instead of being compressed; but the long narrow body is still maintained, which is a very unusual feature in other genera of water mites.

1. *Oxus strigatus* Müller, 1781.

BODY.—Long and narrow (fig. 1). It is so much depressed that there is no difficulty in getting this

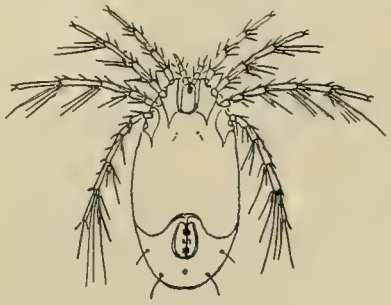


FIG. 1.—*Oxus strigatus.*

mite to lie flat for examination, either dorsally or ventrally. It is about 1.16 mm. long, and about 0.60 mm. in width. Colour varies, sometimes it is of a bluish green, with yellow and brown markings: others are all yellow with brown markings. It has

no flute or hollow on the dorsal surface like *Frontipoda musculus*, but it has very strongly marked dermal glands on the dorsal surface.

Legs.—Generally partake of the body colour, but much weaker in tone. First legs about 0.44 mm., fourth legs about 0.80 mm. First three pairs of legs have claws, but the fourth pair have a long, stiff bristle at the end of the tarsi, and

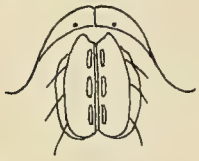


Fig. 2.—Genital Area.

Fig. 3.—Epimera.

two smaller bristles. All legs are well supplied with swimming hairs.

Epimera.—Extends backwards about 0.76 mm., and forms one group, as shown in fig. 1. It is necessary to notice the stiff, short bristles on the anterior margin (fig. 3) of the epimera, because in the other species this is the best point of identification.

Genital Area.—(Fig. 2.) Has three discs on each side of the median line.

Localities.—Fairly common. Mr. Taverner has found it in Scotland. Mr. Scourfield in Epping Forest. I have taken it on the Norfolk Broads, and at Keston, in Kent.

2. *Oxus longisetus* Berlese, 1888.

Body.—Very similar in shape to *O. strigatus*. Length about 0.7 mm.; width about 0.46 mm.

Fig. 4.—*Oxus longisetus*.

Colour a pale red. I do not think it needs further description.

Epimera.—The great point of identification is the long bristles on the anterior margin of the epimera. I have left the palpi and legs out of the drawing, so that these bristles can be easily seen.

Localities.—It is a rare mite. The only specimen I have seen was one found near Oban, N.B., by Mr. Taverner in July, 1898, from which the drawing (fig. 4) was made.

GENUS *HYDROCHOREUTES* KOCH, 1842.

This genus like the last, contains at present only two British species. Again, they are the same two species as described by Piersig from Germany.

The characteristics of this genus are: Body soft. Legs and palpi long in proportion to length of body. Claws to all feet. Six discs, three on each plate. The males have a petiolus, and a peculiar formation to the fourth segment of the third pair of legs.

1. *Hydrochoreutes ungulatus* Koch, 1842.

Female.—Body: Oval (fig. 5). Length about 0.96 mm.; width, about 0.74 mm. Almost colourless with brown markings on the dorsal surface. In the centre of the back is a yellow T-shaped mark.

Fig. 5.—*Hydrochoreutes ungulatus*.

Legs.—Very long and slender, compared with size of body. First pair about 1.96 mm. long, fourth pair about 2.04 mm. They are of a very pale blue tint and quite transparent.

Epimera.—Large, in four groups. The posterior pair slightly angular on the hind margin (fig. 5).

Palpi.—Long and slender like the legs. About 0.82 mm. in length. Quite without the pegs we have noticed in some other mites, but with a large number of hairs.

Genital Area.—Two plates with three discs on each (fig. 6). Very much like the plates of *Hygrobates*, and *Piona*, a genus which we have not yet discussed.

Fig. 6. Fig. 7. Fig. 8.

Hydrochoreutes ungulatus.

Fig. 6.—Genital Area. Fig. 7.—Male. Fig. 8.—Petiolus.

Male.—A little smaller than the female, and of rather different shape (fig. 7), it has the long legs and long palpi as in the female; but the fourth segment of the third pair of legs near the joint which unites the fifth segment, has a very peculiar sickle like spine. This is opposed to another one, shorter and straighter, having the appearance of a thumb and finger. No doubt these answer the same purpose as the spur we find on some male *Arrenurus*, and the socket arrangement in male *Curvipes*. I have not figured this, because I think the petiolus is quite sufficient for identification (fig. 8).

Localities.—Not very common. Dr. George has found it in Lincolnshire, Mr. Scourfield in the Lake district, I have taken it in Epping Forest, and in Worcestershire.

(*To be continued.*)

NOTICES BY JOHN T. CARRINGTON.

Man Past and Present. By A. H. KEANE, F.R.G.S. xii. + 584 pp. 8 in. × 5¼ in., with 12 plates and other illustrations. (Cambridge: The University Press, 1899.) 12s.

This book is one of the Cambridge Geographical Series, and is really a continuation of the work by the same author in that series upon Ethnology. The two preliminary chapters of the work before us, indeed, form a kind of link between the two volumes dealing with the cradle, origin, and migrations of the Pleistocene precursor, also with the Stone and Metal ages, and further evolution of the human races. The next three chapters deal with the negroes. Then four discuss the Mongols, a couple more the American aborigines, and the last three the Caucasic peoples. The plates consist of groups of photographic portraits of typical individuals selected from the various races described. The book is well arranged, concise, and, read in conjunction with the author's previous work on Ethnology, is instructive and highly educational.

Curiosities of Light and Sight. By SHELFORD BIDWELL, M.A., LL.B., F.R.S. xii. + 226 pp., 7¾in. × 5¼in., 50 illustrations. (London: Swan Sönnenschein and Co., Ltd., 1899.) 2s. 6d.

This book provides some delightful reading both to the layman and also to the scientific mind. Based upon some unconnected lectures at different institutions, the matter has been enlarged and re-arranged so as to make the points treated, form a more continuous sequence. Although writing in a distinctly popular style, Mr. Bidwell has brought in many matters of strictly modern scientific importance. In fact at the end of each chapter we find we have not been reading some text book matters popularised, but that we have been grasping, in an easy manner, the wave theory of light, or the theory of colour, or some other far reaching principle. Many curious phenomena are also introduced that one does not find in general reading and these give a decided freshness to the book. The analogies used to illustrate some points are simple, but very effective. Our eyes are shown by many examples to be far from perfect when considered as optical instruments, and several of the experiments illustrating these defects, and also some optical illusions, are quite simple and can be carried out by any interested reader, with very little apparatus at command. This also applies to the chapter on curiosities of vision and the lecturer on colour and vision will find some very useful experimental information. The book is printed upon good paper and in large type for comfortable reading.

The Process Year Book for 1899. Edited by WILLIAM GAMBLE. viii. + 108 pp., 10in. × 7in., with frontispiece and 76 illustrations. (London: Penrose and Co., 1899). 3s. 6d.

This is one of the most beautiful examples of modern printing and illustration we have yet seen. The plates, plain and other blocks, are perfect examples of process reproduction and printing. It is hard to choose which one chiefly admires. Perhaps a study after Gainsborough is the most effective. The frontispiece is a splendid example of printing, and a fine portrait of Lord Kitchener, it is perfectly life-like. The progress of three-colour printing is liberally shown in some good pictures. The articles are varied, and some are by writers of authority.

Missouri Botanical Garden. Tenth Annual Report, edited by PROF. WILLIAM TRELEASE. 211 pp., 9½in. × 6½in., illustrated with sixty-one plates. (St. Louis, Mo.: At the Gardens, 1899.)

The chief scientific paper in this volume is devoted to a critical examination by F. Lambion-Scribner, of the grasses in the Bernhardi Herbarium, collected by Thaddeus Haenke and described by J. S. Presl. This article is illustrated by fifty-four plates of grasses, cleverly drawn in outline. It will be found a useful monograph to students of the order, as the species cover a considerable geographical range, including North and South America and some Pacific islands. Another paper is upon a "Sclerotoid Disease of Beech Roots," by Hermann von Schrenk, which is also illustrated by two plates and a diagram. A biographical sketch, with portrait, is given of the late Edward Lewis Sturtevant, who has bequeathed his extensive library of prelinnean works to the Missouri Botanical Garden. It is said to be the most perfect collection of that class of books in existence, and contains many great rarities. Dr. Sturtevant, though graduating for the medical profession, never practised but devoted his whole attention to scientific agricultural work. A considerable bibliography of his literary efforts is given, including many books and papers of value to agriculturists.

Our Insect Friends and Foes. By BELLE S. CRAGIN, A.M. xix. + 377 pp., 8in. × 5½in., with 255 illustrations. (London and New York: G. P. Putnams Sons, 1899.) 7s. 6d.

The preface of this work commences with the words "A boy of eleven once asked me," and this book is evidently intended as an answer to his question. It is most elementary, but still will be useful for school work as at any rate it will enable the scholars to distinguish the orders of insects. It is, however, a great pity, that while expending so much money on the numerous illustrations, care was not taken to have them drawn by someone who understood what was required. They appear, indeed, to have been executed by a similar kind of artist to those who supply impossible species for Christmas cards, and it seems to be of little consequence in some instances in various Lepidoptera, whether the anterior or the posterior pairs of wings are the larger. Many of the figures are absolutely wrongly drawn. Take for instance the illustrations on pages 97, 95, 126, etc. It is unfortunate what might have been a useful book has been so disfigured.

Handbook of British Breeding Birds. By W. Percival Westell. 188 pp., 5¼in. × 4¼in., illustrated. (London: Henry J. Drane, n.d.) 6d.

The first point about this book that meets one's notice is a ten-line preface by the late W. E. Gladstone, chiefly regretting that it could not be longer on account of the state of his health and numerous engagements. There are also two introductions, one by Claude St. John and the other by the author. The illustrations are very crude and often useless. For instance that on page 58. Others are better, but do not appear to have been drawn for this work. There is little to say of the letterpress which is largely tabular.

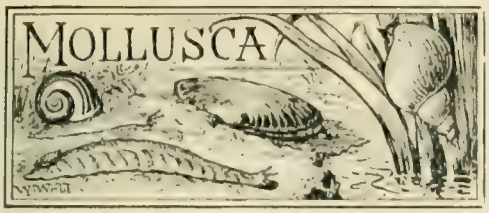
NOTE.—Notices of a number of books unavoidably stand over through pressure on our space.

Floral Aberrations.—During the past season I met with some curious instances of malformed flowers, the most striking being furnished by a plant of red deadnettle (*Lamium purpureum*). It attracted my attention by apparently bearing, instead of the numerous whorls of flowers, one whorl only terminating the stem. Closer inspection showed that the seeming whorl consisted merely of one flower, of a type that placed it far from the order Labiatae, and indeed outside the group Gamopetalae. The sepals were separate; the petals also distinct, narrow, and long-stalked, with the blade spreading. The stamens, like the sepals and petals, were five in number and all of a similar length. Instead of the usual form of pistil, this organ was spindle-shaped, and terminated by a short style. It will be seen that this regular polypetalous five-stamened flower departed greatly from the usual, irregular, two-lipped, gamopetalous flower, with four stamens arranged in a long and a short pair, of the Labiate plants. Another member of this order with curious flowers, was a plant of woundwort (*Stachys sylvatica*). The flowers were green and red in colour, the corollas widely two-lipped, and not much longer than the calyx. The stamens were barren, the anthers being small and shrivelled. In most cases the ovary was much larger than usual, the interior occupied by a bud of small greenish leaves in place of ovules. In a cornfield near Horsley, Surrey, many specimens of a cornsalad showed malformed flowers of a very peculiar character. They were all yellowish and much larger than the ordinary flowers. The calyx instead of being small or even quite indistinct, was here the most conspicuous member of the flower, and was divided into five spreading lobes. The corolla was smaller and the stamens abortive. The pistil in some flowers was represented by a small leaf-like organ situated in the centre. All the surfaces of these flowers were strongly papillose. A few years ago I came across some abnormal bramble flowers of a very instructive character, and during the present year encountered somewhat similar flowers. In these latter flowers, the sepals were larger and more prolonged than usual, the petals dull red, the stamens all sterile, and the exceptionally numerous carpels spindle-shaped. The floral axis was either shortened or so lengthened, that a distance varying as much as an inch separated stamens from carpels.—*C. G. Britton, 35, Dugdale Street, Camberwell, S.E.*

Wild Life in London.—The autumnal visit of the seagulls to the river Thames at London has, within the last few years, become as certain a migration as that of birds to our shores from the north. They arrived in numbers about the 14th of October, though some came previously, and by that date there were several hundreds tame enough to be fed on the embankment wall between Blackfriars and Waterloo Bridges. The windows of the editorial room of Science-Gossip at 110, Strand, overlook the precincts of the ancient Chapel Royal, Savoy, where the open space is planted with grass and a couple of dozen plane and other trees, some being sixty or more feet high. During the past summer we have observed from our windows at least four species of butterflies, viz., *Pieris brassicae*, *P. napi*, *Anthocharis cardimines* and *Vanessa urticae*. In the trees a pair of wood pigeon (*Columba palumbus*) successfully reared two broods of young, while there are numerous nests of common sparrows. The males of the vapourer moth (*Orgyia antiqua*) were often seen. It must not, therefore, be said that one cannot study natural history in London, as this green oasis is only separated from the stream of traffic in the Strand by the breadth of the house.—*Flora Winstone, 21st October.*

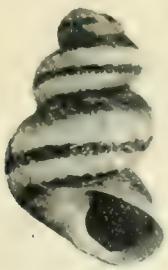
Köelrenteria Fruiting in England.—I forward you a specimen *Köelrenteria paniculata* in flower and fruit. It was cut from a tree in my garden at Epping, in Essex. The shrub is a native of North China, and it is stated in most botanical books that it never fruits in England. It did so, however, in 1860, when I picked some seeds at Kew from one of which my plant was raised. This specimen has not fruited until this autumn, though it has bloomed on previous occasions. The fruiting may probably be accounted for by the hot summer of last year ripening the wood that bore the flower of this season. The seed vessels are handsome, being crimson and yellow; which with the bright yellow autumnal tint of the leaves, makes a beautiful object in the garden. I hear from the Secretary of the Royal Horticultural Society, that a few other trees of this species have produced this season flowers and fruit in various parts of England. We are indebted to Miss Rose Purchas, Alstonfield Vicarage, Ashbourne, for the illustration.—*William Pearson, Redgrove, Epping.*

Köelrenteria Paniculata in Fruit and Flower.



CONDUCTED BY WILFRED MARK WEBB, F.L.S.

TWO REMARKABLY-FORMED SNAILS.—In a large general collection of shells recently acquired by Messrs. Sowerby and Fulton appeared two curious monstrosities. The first is the common snail, *Helix aspersa* Müller, with the whorls completely separated. For a monstrosity the form of the shell is remarkably regular, and it is so freshly coloured that it does not suggest anything in the shape of a malady. The second is an elongated example of *Helix vermiculata* Müller, a very common European snail. This specimen is perhaps further removed from the normal form of its species than the last, its diameter being usually considerably greater than its length. This is a case of accident in the early youth of the snail, the effects of which are very apparent in the first whorls of the shell. The injury will readily account for the abnormality of its later growth. Both shells are labelled "France," but no information is given as to the exact localities in which they were found. The accompanying photographs are by Mr. W. M. Webb. —*G. B. Sowerby.*

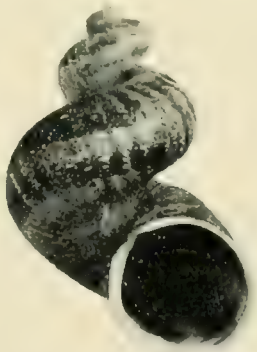


HELIX VERMICULATA, MONSTROSITY.

THE OLD BED OF THE LEA.—The field-club excursions of the London branch of the Conchological Society to the old bed of the river Lea, at Park, Tottenham, showed what a wealth of molluscan life there existed, and now has been utterly destroyed by the diversion of the stream in the formation of some huge reservoirs for the East London Water Company. In many places the bed was covered with shells, amongst which were noticed *Succinea elegans*, fine but decorticated; *Vivipara vivipara*, the green bandless variety being by no means rare; *Neritina fluviatilis*, varying much in colour from a black and white tesselated form, to a pretty crimson one. Many also were trifasciated; *Valvata piscinalis*; *Bythinia tentaculata* and its var. *alba* and a few specimens showing a pathological (?) white line on the periphery; *Limnaea peregra*; *L. auricularia*, *L. palustris*, not common, and *L. stagnalis*. Of the last some were very thin shelled and showed marked ribs or striations, and one or two specimens found by me were beautifully banded with white. *Planorbis corneus* was plentiful, but local, and several places were found covered with its shells which had been eaten probably by *Dytiscus marginalis* [See "Journal of Malacology," Vol. vi., p. 30] by the removal of the whole of one side of the shells, leaving the other perfect. They were collected after the manner of *H. nemoralis* round a "thrush stone." *Planorbis marginatus*, *P. carinatus*, *P. vortex*, and *P. albus*. *Pisidium fontinale*, and *P. annicum*; *Sphaerium corneum*, very fine, *S. lacustre*, and *S. rivicola*, abundant in spots and fine, *Anodonta cygneus*, and the form called *anatina* of *Unio pictorum*, and *U. tumidus*, the latter of the two far outnumbering the former.—(*Rev.*) *J. W. Horsley, St. Peter's Rectory, Walworth, S.E.*

NEW LOCALITY FOR CLAUSILIA BIPLICATA.—Hammersmith is the locality given in the older books on British land and freshwater shells for *Clausilia biplicata* Mont.; but failing to find specimens there, the writer met with better success lower down the river at Putney. The swamp in which the shell used to be found in profusion having been reclaimed, Putney can no longer be considered a habitat for this rare British snail (S.-G., Vol. ii., N.S., p. 207). Hearing recently that *Clausilia biplicata* had been collected higher up the river at Mortlake, the writer made a search, and can with pleasure say that it is by no means rare there, and was found by him in an active state in the middle of October. From the same spot apparently came the white specimens exhibited not long ago before the Conchological Society, on behalf of Mr. G. E. Mason, who found them, and which form the subject of a note in the current "Journal of Conchology."—*Wilfred M. Webb.*

HELIX ASPERSA VAR. EXALBIDA.—Until recently I had always had some doubt about the statement on p. 63 of the second edition of Mr. Lionel Adams' Manual of British Land and Freshwater Shells, to the effect that the variety "*exalbida* is local, but often not uncommon where it occurs, especially in the West of England and in Kent." I have had many opportunities of finding this form in Kent, but during over twenty years' experience of that county, have found two specimens only. Neither has it occurred during infrequent visits to the West of England. Not



HELIX ASPERSA, MONSTROSITY.

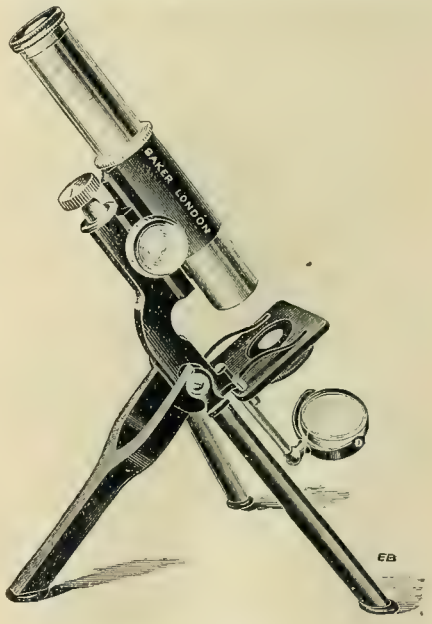
any of my correspondents have mentioned it as being frequent in their localities. On a visit, however, to the Lincolnshire Coast sand-dunes from September 29th to October 3rd, I found a number of the variety *exalbida*, which appeared in the proportion of about seventeen per cent. of the examples of *H. aspersa* observed. Many were turned out from their hidings during hibernation. Unfortunately, most of the specimens were badly eroded. Dissection of the eyes displayed only the usual colour, neither did the animals themselves indicate albinism. —*John T. Carrington, 110, Strand, London.*

MICROSCOPY

CONDUCTED BY F. SHILLINGTON SCALES, F.R.M.S.

THE MALARIA PARASITE.—Our readers can hardly fail to have been interested in the recent investigations of Major Ross, R.A.M.C., into causes and dissemination of malaria; investigations which appear to have solved the hitherto apparently insoluble problem as to the mode of life of the parasites to which malaria has now been traced, and to have given the final *coup de grâce* to the old theory that it is connected with a certain condition of the soil. It is now placed beyond a doubt that malaria is due, and probably due only, to a parasite belonging to the family Haemaoebidae, passing a stage of its existence in the stomach of certain mosquitoes, and by the bites of the latter infecting the blood of man. The life-history of these parasites has been completely followed by Major Ross in *Culex pipiens* and confirmed by others in *Anopheles claviger*. We would refer those who desire fuller information on this point to a paper by this investigator in "Nature" for August 3rd. The interest now lies in the question of the exact species of mosquito rather than that of the parasite. Major Ross, in more than one report has adduced facts in support of his strong belief that the dissemination of malaria is confined only to the comparatively rare "spotted-winged" mosquito, belonging to the genus *Anopheles*, and which has been traced to two species in India and to one in Italy. Other and commoner forms of mosquito, such as the "brindled" and "grey" mosquitoes, are believed to be quite harmless, if painful, in their bites, though Koch has traced malaria in Tuscany to the bites of *Culex pipiens*. If this should be finally placed absolutely beyond a doubt, it will be of the greatest importance not only to our military stations and camps, but to many crowded districts, towns and cities. Mosquitoes of the genus *Culex* breed in artificial collections of water, such as pots and tubs, cisterns, wells, and drains, but those of the genus *Anopheles* breed or are developed from larvae or grubs found only in natural ponds and puddles of stagnant water in which green algae are growing, and seldom in larger bodies of water such as tanks or streams, where they would be liable to be devoured by minnows, etc. Still, whether confined to the genus *Anopheles* or not, it seems certain that the flies breed in puddles, and are not of the common or domestic kind. If this be so, and it can be placed beyond question that these mosquitoes breed only in spots sufficiently isolated to be dealt with by public measures of repression, and that the malaria from which perhaps a large town is suffering can be abated by the filling up or otherwise treating with simple means a few small puddles, we have arrived at a result of investigation that cannot easily be overestimated. It has already been found for instance, that a drachm of paraffin oil poured on the surface of a pool about a square yard in area has been sufficient to kill all the *Anopheles* larvae in six hours. It was to solve these matters finally that the Liverpool School of Tropical Medicine sent out its recent well-equipped expedition to Sierra Leone, to follow up the work done by Major Ross in India, and to put the methods suggested to practical proof. Every assistance was given them by the Government, and as we understand that the expedition returned on October 7th to this country, well satisfied with their labours, we may look for an interesting report. It may be noted, in conclusion, that only one member of the expedition, Mr. E. Austin, Assistant in Diptera, British Museum, became infected with malaria, through sleeping one night without mosquito-curtains.

BAKER'S DIAGNOSTIC MICROSCOPE.—In connection with the foregoing note on the malaria parasite, it will probably interest our readers if we illustrate and describe the microscope originally designed for Major Ross, R.A.M.C., by Mr. Chas. Baker, of High Holborn, and used by him throughout his research. As will be seen, it stands upon a light but rigid tripod, with a spread of 7in., has coarse and fine adjustment, condenser with iris diaphragm, plane and concave mirrors, etc. The whole packs into the neatest of leather cases, 11in. × 3½in. × 3in., furnished with a strap for the shoulder, and loops for a military belt. The case is lined with baize or soft chamois leather. There is yet room for two eye-pieces and three objectives, two bottles of stains, and a bottle of immersion oil, together with a double nose-piece, but the total weight is only four pounds. Altogether, the whole is a marvel of compactness, and well thought-out efficiency. The microscope will focus satisfactorily a



BAKER'S DIAGNOSTIC MICROSCOPE.

$\frac{1}{12}$in. immersion lens, and is, we think, the best travelling miscroscope sold. We have for some years had one in our own use when travelling, and can speak highly of it. It may interest our readers to know that as we write Messrs. Baker are despatching outfits for the use of the Medical Staff at the Cape, in connection with the Transvaal war. We may add that, as described above, with all extras, including $\frac{2}{3}$in., $\frac{1}{6}$in., and $\frac{1}{12}$in. imm. objectives, the outfit costs £13 7s. 6d., but the microscope itself, in case, can be bought for £3 12s. 6d., or with sliding coarse adjustment only, £2 7s. 6d.

"Holoscopic" Eyepieces.—These eyepieces are an entirely new departure, and one on which we can congratulate the makers. They are designed to work with the apochromatic objectives, and possess the so-called "over-correction" necessary for that purpose, but by means of an inner adjustable draw-tube the eyepiece corrections can be varied at will until actual "under-correction" is reached. It follows therefore that these eyepieces can be used with ordinary achromatic objectives also, thus saving the necessity of having two sets of eyepieces. This means of adjustment has a further advantage, in that it enables the eyepiece to be adjusted to any individual objective, very few of the apochromatic series being identical in the amount of their under-correction. The drawtube is graduated to enable the degree of extension to be noted. We have had an opportunity of examining these eyepieces, and find them in every way satisfactory—they give a most brilliant image and exquisite definition. The

makers, Messrs. W. Watson and Sons, of High Holborn, have so arranged them that they all work in approximately the same focal plane, and instead of the too-customary arbitrary numeration or lettering, each eyepiece is marked with its magnification at a certain tube length. Messrs. Watson have, we think, gone rather beyond the requirements of the case in marking the large-size eyepieces 7, 10, 14, and 20 for a *10 inch* tube, and the small-size or "Student's" eyepieces 5, 7, 10, and 14 for the *6 inch* tube. As the eyepieces can of course be used for either tube length, we think this likely to prove confusing. The price of the "Student's" size eyepieces is 17s. 6d., and of the large and capped size 22s. 6d.

"Holoscopic" Objectives.—Messrs. Watson have also sent for our inspection the first two of a new series of achromatic objectives, in which, as they themselves say, a very remarkable degree of aplanatism is attained. To obtain this an entirely new formula has been resorted to. The corrections for spherical aberration are effected by means of a triple back lens, and the objectives have the same corrections as the apochromatic objectives, and require to be used with compensating eye-pieces or with the new "Holoscopic" eye-pieces mentioned above. The lenses sent us were the 12 mm. (½in.) N.A. ·45, and the 6 mm. (¼in.) N.A. ·74. Both are really excellent lenses, flat in the field, of exquisite definition, bearing high eye-piecing well, and though of only comparatively moderate aperture, passing an unusual amount of light. The 6 mm. sent us, being an early lens, was, however, deficient in working distance, but the makers state that this has now been rectified. The lenses are made for either the 6in. or 10in. tube, and on each lens is marked not only the so-called focal length, but the tube length for which the objective is corrected, and the N.A.; this last and the magnifications being exactly stated and guaranteed. The price of either lens is £2 10s., and the makers have other powers in hand. They are anxious to afford every facility for examination and comparison of these new objectives.

Microphotography with Ordinary Cameras.—Messrs. J. H. and R. A. Barbour, of Bangor, Co. Down, have sent us micro-photographs of the spores and sporangia of a fern, also of the hairs and scales of the wing of a butterfly. These were taken with an ordinary Lizar's ½ plate "Challenge" camera, Paget's dry plates, slow, and a round wick reading lamp. The microscope also was a non-inclinable one, and required propping up with books in the necessary horizontal position. The camera lens was removed and the connection between the aperture and the microscope tube was made by means of a black cloth, the image of the object being, of course, focussed on the glass screen. A ten minutes exposure was given, and the paper used was Ilford P.O.P. We have mentioned these particulars at length, with a view to encouraging other beginners to make similar first attempts, and to remind them that much may be done with very ordinary apparatus.

Dendritic Crystals in Paper.—We shall be grateful to any of our readers who can send us any specimens of the above, stating, if possible, where found and the approximate age.

ANSWERS TO CORRESPONDENTS.

Books on Microscopy.—T.M. (Manor Park, E.) (1.) Cross and Cole's "Modern Microscopy" gives full details, suitable for beginners, as well as advanced students, as to mounting. Davies' book is less convenient and less simple. (2.) Hy. Scherren's "Ponds and Rock Pools" is good, so is Slack (see S.-G., Vol. vi., N.S., p. 57 and ante, 173). There are also little books by Butler and Simpson in "The Young Collector Series." (3.) Kent's "Manual of the Infusoria" is a standard authority—3 vols., with plates, worth, second-hand, about 50s. Pennington's "Natural History of British Zoophytes" (10s. 6d.) is useful. If you are particularly interested in Desmids or Diatoms I will name books dealing with these subjects. (4.) I am sorry I have no notes about the Wanstead Ponds. The Richmond Ponds are alluded to in Science-Gossip, vol. vi., pp. 86 and 156.

Microscopic Material. — T.W.B. (Old Charlton). The only persons I can suggest other than those you name are Mr. F. P. Smith, of Islington, or Mr. Abraham Flatters, of Manchester. Both advertise in Science-Gossip. There is a series of 48 different preparations put up ready for mounting in 1s. packets, that can be obtained at any microscopical optician's; but if you want specific objects like insect eggs, I would suggest advertising in the Exchange Column of Science-Gossip, when you should have no difficulty in obtaining a satisfactory response.

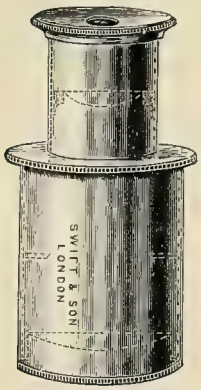
V.T. (Chorley).—Mr. C. F. Rousselet, to whom we sent your queries, has kindly answered them as follows:—The rotifer is *Anuraea serrulata*, a well-known but not very common species. The sketch is not quite correct, nor is it right to say that it lives in its lorica much like *Melicerta* does in its tube. The latter is a structure built round the animal's body for protection, whilst the lorica of *Anuraea* is the hardened integument, or outer skin of the rotifer, organically connected with its body. I am much inclined to think that the pink bodies are the broken-up granular Zoocytium of the flagellate infusorian *Spongomonas sacculus*, which is said to be rust-brown in colour when living. See Saville Kent's "Infusoria," Vol. i., p. 288. The fine white threads are the infusorian *Spirostomum ambiguum*.

MICROSCOPY FOR BEGINNERS.

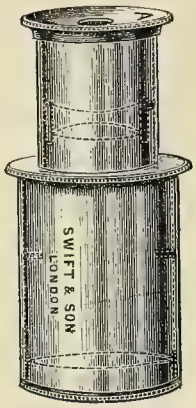
By F. Shillington Scales, F.R.M.S.

(Continued from page 157.)

High power objectives of high class are generally provided with a rotating collar that enables the observer to adjust the distance between the combinations of the objectives so as to correct the lens for variations of cover glass, but this requires more practice than most students have had, and a very general way is to shorten or lengthen the tube, which has the same effect. Thus, supposing the objective is corrected for a cover glass .008 inch thick, it would be necessary to shorten the tube, *i.e.*, decrease the distance between eyepiece and objective if a thicker glass were used, or to lengthen it for a



Huyghenian Eyepiece.



Kellner Eyepiece.

thinner glass. By so doing we should, as already explained, also alter the magnification. With a correction collar we should close the lenses of the objective for a thicker cover, and open them for a thinner one.

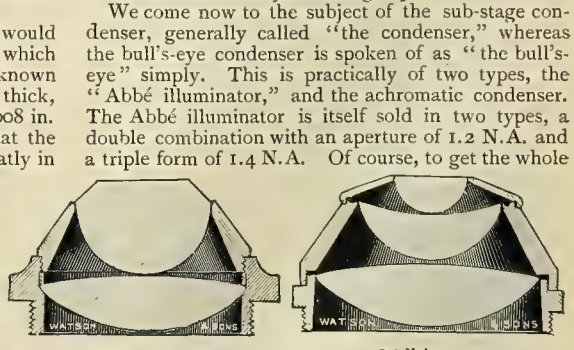
It would be a great convenience if makers would adopt one uniform thickness of cover glass to which all objectives could be corrected. One well-known maker corrects for a cover glass ·006 in. thick, whilst another corrects for a cover glass of ·008 in. It may also be necessary to warn beginners that the magnifications of objectives are too often greatly in excess of what they profess to be, it being easier to make a higher power objective than a lower one of the same aperture. We think the present custom of sending out most student's objectives corrected for a 6 in. tube is a mistake, as the 10 in. is still the standard English tube length. Under any circumstances it would be a great advantage if makers would mark on their objectives, as one or two firms already do, not only the N.A. and the *actual* focal length of the objective, but the tube length for which it is corrected.

Let us now deal with the necessary eyepieces, and on this matter fewer words will suffice than we have thought it advisable to give to the subject of objectives. The "compensating eyepieces" are specially constructed to correct certain outstanding errors in the apochromatic objectives, and are necessary therefore only for that purpose. The eyepieces commonly used with achromatic objectives are the "Huyghenian" or "negative," and the "Kellner" eyepieces. The Huyghenian eyepiece is composed of two plano-convex lenses with a limiting diaphragm in the principal focus of the eye-lens. The diaphragm cuts off the marginal rays, which are useless owing to their too great spherical aberration, but this very aberration helps to correct the aberrations of the objective and so flatten the field. The Kellner eyepiece has no diaphragm and its field is therefore large, being in fact only limited by the size of the eyepiece tube. It has an achromatic meniscus for the ocular and a double convex field lens lying *in* its focus. Though the field is large, the definition is not as good as that of the Huyghenian ocular, and any dust is very apparent. It is used mainly for micrometry, but a micrometer is very frequently inserted in the focal plane of the Huyghenian lens. With projection eyepieces we need not concern ourselves.

Eyepieces are made of different powers, ranging from 4 magnifications up to 15, and even higher. The 4 eyepiece often is unsatisfactory with the short tube length; the most generally useful is the 6 eyepiece. After this, one of, say, 10 magnifications. Above this it is useless to go. We are quite aware that all makers sell eyepieces of much higher powers, as mentioned above, but we have never seen an achromatic objective that would satisfactorily and *critically* bear eyepiering above ten times with a 10 in. tube length. It is only the apochromatics that will bear high eyepiecing, and even in their case the loss of light and depreciation of the image is noticeable. But until the apochromatics were invented the only way to get high magnification was to use high power objectives, such as $\frac{1}{25}$ and $\frac{1}{50}$ in., which we so seldom hear of nowadays.

Before leaving the subject of eyepieces, we would again reiterate what has been so frequently urged upon makers—namely, the manifest disadvantage of marking their eyepieces with any other numeral or letter than the actual number of magnifications given by the eyepiece at the standard 10 in. tube length. It then becomes an easy matter, as already explained (Science-Gossip, Vol. vi., p. 157) to estimate the magnification with any eyepiece or objective, and when used in any tube length.

We come now to the subject of the sub-stage condenser, generally called "the condenser," whereas the bull's-eye condenser is spoken of as "the bull's-eye" simply. This is practically of two types, the "Abbé illuminator," and the achromatic condenser. The Abbé illuminator is itself sold in two types, a double combination with an aperture of 1.2 N.A. and a triple form of 1.4 N.A. Of course, to get the whole



1.2 N.A. 1.4 N.A.

Optical Part of Abbe Illuminator.

of this aperture, the condenser must be in immersion contact with the under side of the object slide. Both are simple, cheap, and easy to work, and are accordingly largely used by students; but in both the spherical and chromatic aberrations are enormous, and they are therefore not satisfactory when used for critical work. The actual aplanatic cone is in both cases *under* .5 N.A. At the same time, the beginner will find it a very useful form of condenser for general work. We prefer the 1.2 N.A. type, and it is also the cheaper of the two.

(To be continued.)

CONTENTS.

THE Astronomer Royal, Mr. W. H. M. Christie, has been elected one of the Wardens of the Clockmakers' Company.

PART IX. of Col. Godwin-Austen's work on the Land and Freshwater Mollusca of India, is nearly ready for issue.

THE successor of Lord Kelvin in the chair of Natural Philosophy at the University of Glasgow, is Professor A. Gray, F.R.S., formerly Professor of Physics at University College, North Wales.

THE veteran geologist, Mr. B. Charles of Highcliffe-on-Sea, Christchurch, Hants, has had a successful season in the Barton Beds, and has added some scarce forms which are available for his correspondents.

WE hear from the author that Mr. A. T. Story's "Story of Photography" in the "Useful Story Series," issued by Messrs. Newnes, Ltd., is about to be republished in a new edition, with the most recent discoveries and facts included.

MR. W. F. H. ROSENBERG, of 48, Charing Cross Road, London, has sent us a neat little "desideratum" price and label list of British birds' eggs, gummed on one side. It is 5½ in. long by 2 in. wide, and costs the moderate sum of fourpence. The scientific name precedes the English name in each case.

A SHORT time since Mrs. George Holt, of Liverpool, and her daughter, Miss Emma Holt, presented £2,000 to the Medical School of that city, and £3,000 to the Anatomical School. These generous ladies have now each sent a donation of £5,000 for the purposes of the Liverpool Physical Laboratory.

DR. CARL PETERS, the explorer, states that besides gold he has discovered mica, saltpetre, and diamonds in a district practically uninhabited at an altitude of 8,000ft. in Mashonaland. After exploring some districts on the Punqwe river, Dr. Peters will proceed to Beira on his way to England.

A COURSE of popular lectures to young people, under the auspices of the Parents' National Educational Union, are to be given at weekly intervals from October 26th to November 16th, in the Horbury Rooms, Notting Hill Gate, London, by Mr. Cecil Carus-Wilson, F.R.S.E., upon The Wonders of Rain, Ice and Glaciers, The Mighty Ocean, and Volcanoes and Geysers. Tickets may be obtained from the Secretary of the Union, 28, Victoria Street, Westminster.

THE Guernsey Society of Natural Science and Social Research has recently issued their Report and Transactions for 1898. It includes the President's address, giving a report of the work done, especially the investigations among the dolmens of Guernsey, that have been carried out at the expense of the States. Mr. A. Collenette gives some interesting tables of the rainfall in the island for the year, also of the average amount of sunshine. Guernsey had a total of 2,090·41 hours of sunshine, which compares well with 1,732·35 at Torquay.

THE seventh International Geographical Congress was held at Berlin at the end of September and beginning of October. The attendance was somewhat larger than at the London Congress, but there was a less proportion of foreigners. It is probable the next meeting will be held in Russia, either in 1903 or 1904.

THE National Association for the Prevention of Consumption has passed a resolution signed by Sir William Broadbent, by which the Council desires to express its opinion that there is no danger of communication from any well-conducted hospital for consumption, and inhabitants of houses in the immediate neighbourhood of such institutions are perfectly safe from local propagation from this source.

DR. OSCAR BAUMANN, who acquired a reputation as an African explorer, died at Vienna on October 12th. He was one of the Austrian Congo Expedition in 1885, subsequently visiting the Cameroons and other parts of East Africa. In addition to a map of the Congo and numerous contributions to the reports of the Geographical Society of Vienna, Dr. Baumann published three books dealing with his travels and observations.

MEMORY training, its laws, and their application to practical life is the object of a school founded for the purpose at 70, Berners Street, London, under the title of the School of Memory Training Memory, like other faculties, may be undoubtedly cultivated to a very high degree, and we imagine that the worst cases of forgetfulness may, with systematic help, be overcome. Mr. Pelman's system, as adopted here, appears to be exceptionally effective.

THE Board of Agriculture notify that the Ordnance Survey Department is issuing a new series of special folding maps for certain towns and the country round, on the scale of 1 inch to the mile. The maps are printed on thin tough paper, are mounted in a cover and cost only 1s. 6d. The roads are marked in colour showing their character and whether metalled. Footpaths, hills, rivers, towns, villages and railway stations are also marked. They should be of use to the Field Naturalist and Geologist, in rambles in new neighbourhoods.

MR. ALEXANDER RAMSEY has forwarded us a set of the "Scientific Roll and Magazine of Systematized Notes," which he conducts. It refers to barometric conditions, and embraces Bibliography, classified under subjects, under the year of publication and authors alphabetically, each item having a reference number. The index, while alphabetical, is arranged in groups to which each subject especially refers. The "Systematised Collection of Facts," are grouped in relation to their connection with each other. The work is one of great magnitude, and now extends in manuscript to over 800,000 folios, averaging a hundred words each.

THE death of Mr. Hamilton Y. Castner, the eminent American practical chemist, is announced as having occurred at Airondacks, New York State. He came over to England twelve years ago, with the object of working his process for the manufacture of alkali-metal sodium. During his stay he turned his attention to the production of aluminium by a process in which metal sodium was required. Later Mr. Castner devoted his energies to the production of sodium on a large scale, by the original reaction by which Humphrey Davy discovered the metals of the alkalies. These were all very successful, as was also his process for electrolytic production of alklai and bleaching powder from common salt.

CONDUCTED BY F. C. DENNETT.

1899 Nov.	Rises. h.m.	Sets. h.m.	Position at Noon. R.A. h.m.	Dec. ° ′
Sun ... 3	7.0 a.m.	4.28 p.m.	14.34	15.6 S.
13	7.16	4.12	15.14	18.0
23	7.33	4.1	15.55	20.22

Nov.	Rises h.m.	Souths h.m.	Sets h.m.	Age at Noon. d. h. m.
Moon 3	7.10 a.m.	11.42 a.m.	4.7 p.m.	0 1 33
13	2.2 p.m.	8.39 p.m.	2.12 a.m.	10 1 33
23	10.2 p.m.	4.30 a.m.	11.50 a.m.	20 1 33

Nov.	Souths h.m.	Semi-Diameter	Position at Noon. R.A. h.m.	Dec. ° ′
Mercury 3	0.49 p.m.	2.7″	15.49	22.18 S.
13	1.15	3.1″	16.45	24.59
23	1.13	3.9″	17.22	25.14
Venus 3	0.34 p.m.	5.0″	15.24	18.29 S.
13	0.46	5.1″	16.16	21.34
23	1.0	5.2″	17.9	23.37
Mars 13	0.52 p.m.	2.0″	16.22	22.7 S.
Jupiter 13	11.45 a.m.	14.3″	15.14	17.10 S.
Saturn 13	1.56 p.m.	7.1″	17.26	22.9 S.
Uranus 13	0.52 p.m.	1.7″	16.22	21.28 S.
Neptune 13	2.9 a.m.	1.3″	5.45	22.6 N.

MOON'S PHASES.

	h.m.		h.m.
New .. Nov. 3	10.27 a.m.	*1st Qr.* .. Nov. 10	1.35 p.m.
Full .. ,, 17	10.18 p.m.	*3rd Qr.* .. ,, 25	6.35 a.m.

In perigee, November 12th, at noon, distant 229,500 miles; and in apogee on 25th, at 2 a.m., distant 251,300 miles.

CONJUNCTIONS OF PLANETS WITH THE MOON.

			° ′
Nov. 4	Jupiter†	3 a.m.	planet 3.39 N.
,, 4	Venus*	1 p.m.	,, 2.24
,, 4	Mars†	12	,, 1.15
,, 5	Mercury†	1 a.m.	,, 0.39 S.
,, 6	Saturn*	Noon.	,, 1.1 N.

* Daylight. † Below English horizon.

OCCULTATIONS AND NEAR APPROACHES.

Nov.	Star.	Magnitude.	Disappears h.m.	Angle from Vertex. °	Reappears h.m.	Angle from Vertex. °
9	∴ T^2 Capricon	5.3	7.49 p.m.	311	Near Approach.	
12	K Piscium	5.0	11.11	104	11.29 p.m.	137
17	T^2 Arietis	5.2	6.52 a.m.	319	Near Approach.	
17	A Tauri	4.5	10.21 p.m.	83	11.29 p.m.	296
18	56 ,,	5.4	6.30 a.m.	140	Near Approach.	
19	Neptune	—	6.10 p.m.	129	7.1 p.m.	299
20	*f.* Geminorum.	5.2	8.3 p.m.	223	Near Approach.	

THE SUN is showing little signs of activity, but small spots appear at intervals, sometimes with great suddenness.

MERCURY is an evening star all the month, reaching its greatest elongation, 22° 18′ east, at 4 p.m. on 16th. At 7 a.m. on 4th Mercury is in conjunction with Mars, which is 1° 48′ to the north. At midnight on 8th Mercury and Uranus are in conjunction, the former being 2° 37′ south. At 11 a.m. on 26th it is in conjunction with Venus, Mercury being 23′ south. If the air be steady and clear this should be readily seen by anyone who will take the little trouble necessary to find the planets in daytime. At 9 p.m. on 30th it is in conjunction with Mars, being 23′ to the north of that planet. The planet is not well placed for observation.

VENUS is an evening star, poorly placed all the month for observation. At 5 p.m. on 14th it is in conjunction with, and 24′ south of Uranus. At noon on 16th it is in conjunction with Mars, which is onl 11′ south of Venus. In a clear sky this should be seen by dint of patient search. On 27th at 9 p.m. it is in conjunction with Saturn, Venus being 1° 54′ south.

MARS is too close to the sun for observation. On 13th, at 9 a.m., Mars is in conjunction with Uranus, which is 38′ to the north.

JUPITER, SATURN, and URANUS are all too close to the sun for observation. Jupiter is in conjunction with the sun at 8 a.m. on 13th; and Uranus is in conjunction at 4 p.m. on 30th November.

NEPTUNE is now getting into good position for observation, rising, as it does on 12th, at 6.1 p.m.

METEORS, should be specially expected on November 1, 2, 4, 6-9, 11-15, 19, and 27.

THE GREAT LEONID SHOWER.—In spite of the brilliant moonlight, it is probable that there will not be so much disappointment this year as in 1897 and 1898 to those looking out for the Leonids on November 14th and 15th, though the display will be shorn of much of its grandeur. It must be emphasised that this meteor shower is essentially a morning one, seeing that it is not until nearly eleven o'clock p.m. that the radiant point rises above the English horizon. Though the radiant point of the shower was expected to be in R.A. 149° 28′, Dec. N. 22° 52′, in the middle of the "sickle" of Leo in 1898, the observers, MM. André and Guillaume, at Lyons, found the apparent radiant to be situated in R.A. 155°, Dec. N. 18°, a little north-west of the 3rd magnitude η Leonis. It will be remembered that these meteors are swift in flight, and leave a train. In observing meteors it is best to mark down their paths upon a map; then the radiant point can very readily be determined. A cheap star atlas suitable for such a purpose is "The People's Atlas of the Stars," published at a shilling by Messrs. Gall and Inglis. The shower certainly deserves looking for. Attention should also be directed to the Andromedes, on the night of the 23rd and morning of 24th, radiating from a point in R.A. 25° Dec. N. 43°, near γ Andromedae. Further information about these meteors will be found in the number of SCIENCE-GOSSIP for November, 1898.

The Vienna Academy of Science has sent an expedition to India to observe the Leonids. Herr Director Weiss, of the Vienna Observatory, is the leader. Observations are to be attempted near Delhi, the Indian Government offering all possible assistance.

THE NEW MINOR PLANET announced on p. 154 as having been discovered by M. Mascart, proves to be really the re-discovery of Pomona, originally observed on October 26th, 1854, by M. Hermann Goldschmidt, near Paris.

NEXT GREAT SOLAR ECLIPSE.—It is announced by the Director of the Marine Observatory of San Fernando in Spain that the Minister of Finance has directed that the instruments for the observation of the eclipse are to be admitted free of duty.

A COMET (*e* 1899) was found by M. Giacobini, of Nice, on September 29th, in the north-western part of Ophinchus. It was faint, and moving in a south-easterly direction. It proves to be a comet previously seen in 1896 and 1898. According to Herr J. Möller, it passed its perihelion on August 27th, when its distance from the sun was 1.73, the earth's distance representing unity. It is now receding from us, therefore its brightness is decreasing.

CHAPTERS FOR YOUNG ASTRONOMERS.

By Frank C. Dennett.

THE SUN.

(Continued from page 155.)

The dark spots or maculae usually consist of two portions, a seemingly black centre, known as the umbra, surrounded by a grey portion, or penumbra. Further study will reveal the fact that the umbra in itself is not black except by contrast against the brilliance of the disc. Furthermore, it will often be found that within the borders of the umbra there are one or more still darker portions known as nuclei. Sometimes one penumbra will contain two or more umbrae. The penumbra is not an evenly grey surface, but is often seemingly made up of fine filiaments, as will be shown later on. The maculae vary in size from the most minute "pores" to enormous spots, having sometimes a diameter of very many thousands of miles. Occasionally they appear singly on the disc, but more frequently as members of a group. Very often the members of a group will be found to be ranged in a curve figured not unlike the letter **S**, a similar curve frequently showing itself in the placing of the umbrae in large spots. Some spots and groups are remarkable for their persistence, others for their evanescence. Some may be observed through several rotations of the sun, whilst others seem to appear, or disappear, almost under the observer's eye. Sir William Herschel was once looking at a group, when he turned his head for a moment, then on looking into the eyepiece again found that the group had disappeared. Other observers have noticed equally rapid changes. Considerable alteration may often be noted in the appearance of a large spot even at short intervals. Occasionally it is found that extensive portions of the umbra of a large spot instead of appearing to be black, are indeed of a brown or amber tint. I have seen this with a telescope of barely 2 inches aperture. Very frequently bridges of brilliant matter are seen crossing the umbra and sometimes the penumbra as well, and rapid changes may often be noticed both in their appearance and direction.

Sun spots are by no means equally frequent at all times. Some years not a single day passes when the sun is entirely free from spots; at other times more than a hundred of the dates on which the sun is observed have the record of no spots. Careful study of observations has led to the conclusion that sun spots have a "period," which Wolf makes 11·1

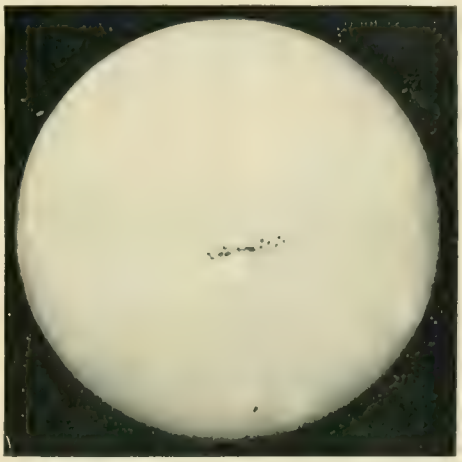
Diagram of Projection Apparatus.

years, and other observers confirm the same. This is the *mean* period, because some variation is noticeable in the length of time separating the maxima, or periods when most spots are visible. Near the time of minimum it is noticed that the sun spots are usually much nearer to the Equator than at the time of maximum.

The sun's equator is not in the same plane as that of the earth's orbit, but inclined at an angle of 7° 15′. In consequence of this the spots do not always appear to travel in the same direction across the disc. Early in June and December they seem travelling in straight lines, but in September and March their path appears convex towards the south and north respectively. Again, in June the pathway of a spot appears to gradually rise as it travels from east to west, whilst in December it sinks.

When a spot or group is passing on or off the disc, it appears to travel much more slowly than when near the middle of the disc, because of the globular form of the sun. Owing to the same cause when a spot is close to the limb it only appears as a dark line, but as it travels on to the disc the thickness of the line increases and the spot in turn appears oval, rounded, and often elongated in east and west; similar effects, but in the opposite order, happening as spots advance towards the western limb. Cognisance of this foreshortening, as it is called, has to be taken when determining the size of spots or groups.

The readiest method of measuring sun spots or



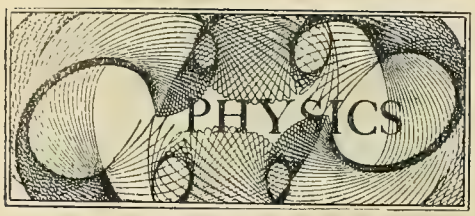
Sun Spots of September, 1896.

groups is that of projection, one form of apparatus for which purpose is illustrated in the diagram.

T is the telescope, A a collar round the telescope body carrying a flat ring of metal about 6in. in diameter to act as a screen to shade the surface D, and strong enough to carry two or three telescopic rods, B B, carrying a light frame C, which carries a white screen D, on which the image falls, and which may well be a disc of ground opal glass. Two methods are available for measuring. The former is to have a line drawn across the middle of the screen, and then to note the exact time occupied by the spot or group in crossing the line. The better way, however, is to have two screens fitting at D, one plain, the other 5in. in diameter divided into half-inch squares, one or two being subdivided into quarter-inch squares. To measure a spot or group make the projected image correspond, when quite sharp, with the 5in. circle, which may be accomplished by aid of the telescopic rods B B. When this is done the divisions correspond to tenths and twentieths of the sun's diameter, so that it is easy to determine the dimensions of a group. Of course the scale disc should be adjustable, so that one set of the lines on the disc can be set parallel with the longest diameter of the group.

A wonderful group of spots, none of them however of great size, appeared on the sun in September, 1896. They are shown on the accompanying reduction of a Greenwich photograph, reproduced by the kindness of the Astronomer Royal.

(To be continued.)



CONDUCTED BY JAMES QUICK.

PHYSICS AT BRITISH ASSOCIATION.—One of the evening discourses at the recent meeting of the British Association at Dover, was given, on September 18th, by Professor J. A. Fleming, upon "The Centenary of the Electric Current," and was illustrated by many successful and interesting experiments. It is just one hundred years ago, since Volta, of Como, invented the instrument which gave us the first practical means of generating a continuous electric current. Volta showed that if two pieces of different metals were placed in contact and then separated they were found to be at different electrical potentials. Starting from this primitive but important discovery, Professor Fleming very ably traced the history of the production of the electric current down to the present day. It is here, when one contrasts the capabilities of the simple voltaic cell with the huge, powerful dynamos now working in the numerous central electric light stations, that one sees more clearly the enormous strides made in electricity during the present century. Passing through the stages of Volta's "Couronne de Tasses," in which the two metals are separated by a conducting liquid, Professor Fleming led up to Cavendish and Faraday. By them and by Oersted and Ampère an enormous advance was made in electricity in discovering the important part played by the medium or "dielectric" surrounding the wire carrying the current and in showing the intimate connection between electricity and magnetism. Electromagnetic induction, resulting in the dynamo electric and other machines, so extensively used all over the world at the present day, may be said to have begun its life with the researches of Faraday and Ampère. Some brilliant experiments were shown illustrating induction, which brought the lecturer to the interesting topic of signalling through space by induction, or as it is more generally termed, "wireless telegraphy." No doubt the reader is acquainted with some of Marconi's successes, achieved in carrying out his method. A good example of its capabilities was given by Professor Fleming during his lecture. A message was sent from the instrument upon the lecture table to the receiving instrument at Wimereux, upon the French coast, and then conveyed by telephone to the President of the French Association for the Advancement of Science, at Boulogne. The reply was conveyed back by the same method and received by Professor Fleming a short interval afterwards. It was not only at Professor Fleming's lecture that experiments with Marconi's signalling apparatus were successfully performed. On the 16th and 18th of September messages were also conveyed *via* Wimereux, to and from the President of the Electrical Congress then being held at Como, Italy—Volta's birthplace. As regards other Physics work done during the British Association meeting there is no doubt that the absence of some leading physicists was due to the Volta Congress at Como, and to the Switzerland meeting of the Institution of Electrical Engineers, both taking place at about the same time. After Prof. Poynting's presidential address before Section A (Mathematics and Physics), on September 14th (S.-G., p. 151), came an important paper read by Mr. G. J. Burch, M.A., entitled "The Spectroscopical Examination of Contrast Phenomena." The two theories of colour vision to the fore at the present day are the Young-Helmholtz theory, which supposes there are three primary colours, red, green, and violet; and Hering's theory demanding only two. Mr. Burch's experiments have led him to the conclusion that blue is also a primary colour; that we have, in fact, separate primary sensations both for blue and violet, besides those for red and green. Mr. Burch thus supports the three-colour theory, but with this modification. On the other hand, Hering's theory requires that red-blindness should be accompanied by green-blindness; but Mr. Burch finds it need not be so accompanied. His experiments show that if the eye is fatigued by exposure to a very intense red light and a spectrum be then looked at, the red is invisible, but the remainder of the spectrum, from green to violet, appears in its ordinary colours. To avoid all errors due to pigment colours, the above experiments were carried out with spectral colours. It will be interesting if other experimenters, working upon similar lines, obtain the same results to those of Mr. Burch. On Saturday, September 16th, when some members of the French Association were present, Prof. J. J. Thomson communicated a most important paper bearing upon the question whether the atoms of matter, as we now consider them, are not capable of sub-division. The three principal lines along which this question may be attacked are, electrolysis, the velocity of charged particles in a magnetic field, and the magnetic deflection of kathode rays. From Prof. Thomson's experiments he considers that electrification consists in the removal from the "atom" of a small corpuscle with which the negative charge is associated, the remaining portion of the atom being positively charged. An important discussion upon platinum thermometry was opened by Prof. Callendar, who suggested the adoption of the variation in the resistance of platinum as a basis for a practical scale of temperature. Prof. Carey Foster was of opinion, however, that for absolute values the gas thermometer must be used, because we have no theory of the variation of resistance with temperature. Dr. Chree also said that some platinum thermometers purchased by the Kew Observatory had worked in a peculiar manner and were not satisfactory. Principal Glazebrook suggested that before accepting platinum as a standard, experiments should be made to ascertain whether other metals—such as gold, were more efficient. Mr. Alexander Siemens, M. Inst. C.E., reviewed the application of electricity to machinery used in ships; and the more recent improvements, such as substituting electric motors for small engines distant from the boilers, by this means much steam-piping with consequent leakages is avoided.

REFRACTIVE INDICES OF CHLORIDE SOLUTIONS.—In the Royal Society Proceedings 64, an account is given of the determinations of the refractive indices and densities of solutions of various chlorides. From these observations it appears that both the densities and the refractive indices increase with the molecular weight of the substance in solution. An exception occurs in the case of the refractive index of potassium chloride, which is slightly lower than that of sodium chloride. In these experiments a hollow prism was used, and filled with the solution in question, care being especially taken to keep it at a temperature of 18° C., as the slightest variation was found to make a considerable difference in the final values obtained.

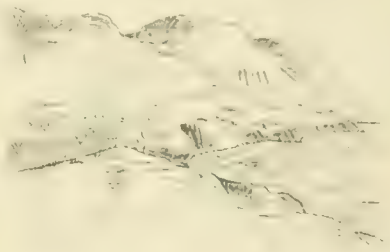
GEOLOGY

CONDUCTED BY EDWARD A. MARTIN, F.G.S.

FAUNA OF THE IGHTHAM FISSURE.—An account of the remarkable remains which Mr. Lewis Abbott found during his exploration of this famous rock-fissure was published by the Geological Society in 1894 (Q.J.G.S., Vol. L., pp. 171 and 188). Subsequently Mr. Abbott, by persevering in his investigations, added five more vertebrate forms, viz., a large bat, the shoveller-duck, and some small passerine birds closely allied to, if not identical with, the red-backed shrike, the chaffinch, and the hedge-sparrow. Subsequently the polecat, otter (?), and swallow were found. The work has since been successfully carried on by Mr. Frank Corner and Mr. A. S. Kennard, and further valuable finds have been made, which have recently been described by Mr. E. T. Newton, F.R.S. In addition to the main fissure, various collateral fissures have also been explored. Amongst added species are the goose, peregrine falcon, blackbird (?), hare (*Lepus variabilis*), rabbit, Alpine vole, weasel, wolf (?), cat, and badger. Mr. Newton points out, in the new volume of the "Quarterly Journal," that these contents bear a resemblance to the fauna of an ossiferous fissure at Champs Gaillards. This also includes several northern species which indicate, in no uncertain way, the extension southward into France of extreme Pleistocene cold. Although evidence of the great Ice Age is wanting in Kent, here is distinct proof of a great degree of cold, when with the progenitors of its present fauna, there also lived the Arctic and Norwegian lemmings, the Arctic fox, and the Siberian vole.

NEW CARBONIFEROUS LAMMELLIBRANCHS.—Since the publication of Dr. Wheelton Hind's monograph (1895), when he pointed out that only one lamellibranch was known to occur in the Upper Coal Measures of Great Britain, he has discovered three others, which he has named *Anthracomya calcifera*, *Carbonicola vinti*, and *Ctenodonta pentonensis*. The first named is found in what is evidently a distinctive zone, which occurs much higher than the zone characterised by *A. phillipsii*. The zone of *A. calcifera* is 300 feet below the Penkhull Sandstone.

ANCIENT WATERSHEDS IN THE SOUTH OF ENGLAND.—From the courses pursued by the rivers of the south coast, it is easy to perceive that these must have been carved out under different conditions as to watershed from those now prevailing. Instead of passing east and west, as they would have done, had they commenced to flow while the troughs and ridges of the Downs and the Wealden area were as now, they run north and south through passages carved out of the hills. This is so, whether northward, as the Mole, Wey, and Medway; or southward, as the Cuckmere, Ouse, Adur and Arun. The high ground of the dividing watershed must, at the time of their birth, have been east and west over the Weald, and the easier and quicker course was to carve north, and south, through the minor ranges, and assume the physical features which they now present. The folding and denudation which has subsequently taken place here, also shows itself in the Isle of Wight, where the course of the rivers show us that upheaval must have been greatest where are now the regions of least elevation. At both ends of the island rivers cut through the chalk downs. These have been enormously denuded at Freshwater Bay by the work of a very much greater river Yar than is now to be seen. On the east of the island, the present puny river flows in the cutting, so to speak, between Brading Down and Bembridge Down. In both cases there are wide alluvial flats on each side of the existing streams, their level being but slightly raised above existing sea-level. It is idle to suppose that these rivers had their origin in the high Downs which now constitute the backbone of the island, although these may now contribute to the rivers' present existence. A thick elephant gravel-bed is exposed on the chalk cliffs in Freshwater Bay, and this is good evidence of the greater extension of the former river; of the denudation which has taken place; of the extent of land to the south, which the river formerly drained; of the velocity of its former current; and of the height of the watershed far away to the south. Before the sea breached the chalk between the Needles and the main land, the Frome, which now



FRESHWATER GAPS, ISLE OF WIGHT.

emerges at Poole, was the river which here passed eastward along one of the great post-Oligocene synclinal folds, and this received as tributaries the northward-flowing rivers of the Isle of Wight. On the northern side this ancient river would have also received the Stour, the Avon, and the Itchin; whilst on the south besides the eastern Yar, the Medina, and the western Yar, it probably also received a tributary which ran between the Needles and Dorset, and along whose course the sea in later times gradually encroached, when the separation of the island became completed.—*E. A. Martin*

SANDSTONE TUBES.—I am sending a specimen of some curious concretionary masses occurring in the Upper Greensand at St. Catherine's Point, Guildford, doubtless familiar to many of your readers. They occur in contorted sheets and tubes, similar to the sample, frequently over a foot in length. I should be obliged if you could enlighten me as to their mode of origin. An analysis of the specimen sent shows it to consist of sand cemented by a mixture of iron oxide and hydrated iron oxide. The interior of the tube was filled with incoherent sand.—*Oswald H. Evans, Marlow Villa, Churchfield Road, Walton-on-Thames.*

[Concretions and tubes of iron sandstone are common in such formations as the Upper Greensand, the Hastings Sands, etc. They originate in the segregation of the iron sand around organic nuclei. In this instance, the nucleus may have been a sponge, or a cord-like fucoid, which existed sufficiently long to give the mould to the concretion, afterwards yielding to the usual decomposition. Such impressions and casts are often the sole evidence obtainable in some formations of the existence of soft, fleshy substances.—E.A.M.]

CONTRIBUTED BY FLORA WINSTONE.

Cosmos (Paris), 16th September. This number contains a history, signed by initials only, of the use of mercury pumps in laboratory work, including a description of the principle of the Sprengel pump. M. Emile Maison writes of the porpoise, with an illustration of the animal just after a leap from the water. The family of Delphinidae, he says, is the most interesting of all the marine fauna, and of all the genera comprised in this group, the porpoise is the one most worthy of study. The article, however, treats the subject from a humorous rather than a scientific point of view. Some notes by M. H. Couturier de Bricagè on the situation and climate of Alaska are especially worth reading. The writer considers that the Canadians are not in such a favourable position for further exploring the mining treasures of the soil as the Americans. (23rd September.) M. Laverune has an article on the plague in Europe. The microbe was discovered by Yersin and Kitasato. It does not appear to be easily conveyed in the air, but chiefly by the skin and through the digestive organs. Infection by the skin is usually from fleas and other parasitic animals. M. Laverune entirely differs from the opinion of M. Simond that the plague epidemic usually commences with rats, and is conveyed by them to men, and from thence by man to man. He points out that there was a great plague epidemic in England in 1348, but rats were unknown in this country previous to the sixteenth century. This number also contains some illustrated notes by M. A. Acloque on hemogregarines, the parasites of the red blood corpuscles. The hematozoa of malaria and gout are figured, magnified several hundred times. The malarial microbe is polymorphous and has three principal types, the spherical, whip, and crescent forms. (30th September.) M. Albert Larbalétrier commences a history of the growth and cultivation of the olive tree in Provence. It is a tree whose range is greatly limited by climatic influences, as it will not flourish in a low temperature nor in one of long-continued heat. The writer details the earliest known record of the cultivation of the olive tree, which appears to have been in Syria, and describes the important part the leaves, oil and branches have occupied in various historical scenes. M. C. Marsillon describes with many illustrations the construction of the Yukon railway, showing the stupendous engineering difficulties that have been overcome. (7th October.) An article by M. Emile Maison entitled "From the Cape to the Transvaal" is well worth reading, especially at the present time. The writer, however, touches very little on the point of the present political complications, but gives a concise history of the land from 1486, downwards. He also describes certain ethnological peculiarities of some of the races. M. Abbé L. Pichot gives an account of an acetylene generator recently invented by M. A. Rieffel. Though the idea appears good, it seems somewhat too complicated for general use. M. A. Larbalétrier continues his article on the cultivation of the olive tree n Provence.

City of London Entomological and Natural History Society.—1st August, 1899.—Exhibits: Mr. Fuller, series of *Dicycla oo* taken at Walthamstow this year, at Sugar and a specimen of *Mamestra sordida* from Darenth. Mr. J. Riches, a suffused specimen of *Abraxas grossulariata* with no black spots across the central area of the hind wings, found on a wall at Hornsey Rise. Mr. D. C. Bate, a number of the latter insect fed upon *Euonymus japonica*, having a decidedly dark general appearance. Mr. Clark, two beautiful varieties of *Noctua festiva*, and one *Grammesia trigrammica* suffused and very dark, from Polegate. Mr. A. Robertshaw sent two cocoons of *Saturnia pavonia* one brown and one pale. When the larvae spun up, all the cocoons were pale, but those put in a warm greenhouse having much moisture in the air, turned brown after about three days; one kept in a dry cool atmosphere retained its pale colour.—*H. A. Sauzé, Hon. Sec.*

South London Entomological and Natural History Society.—Aug. 24th, Mr. Robert Adkin, F.E.S., in the chair.—Mr. Edwards exhibited a number of insects of various orders from Borneo and India, including the large bee *Xylocopa latipes*, of which the male has paddle-shaped fore legs, the enormous digging wasp *Triscolia procera*, the giant ant *Camponotus gigas* and several remarkable species of Pompiliidae, together with a large immature *Tarantula*, specimens of the crab spiders, *Gasteracantha*, and the rare allied genus to the scorpions, *Thelyphonus*. Mr. West exhibited three species of Hemiptera, *Oncotylus viridiflarus* found on *Centaurea* at Wisley, *Tricopsylla walkeri*, found on buckthorn at Box Hill, and *Terenthia loeta*, obtained by sweeping at Reigate. Mr. Patteson reported that a specimen of *Deilephila livornica* had been taken at Limpsfield, at light. Mr. Adkin exhibited a series of *Acidalia aversata*, bred from ova laid by a female captured at Lewisham. The whole brood were dull, non-banded forms, like the female parent, and very distinct from the ordinary light form.—*Hy. J. Turner, Hon. Report Sec.*

Yorkshire Fungus Foray.—The Mycological Section of the Yorkshire Naturalists' Union, held a successful fungus foray, near Askern, on the 25th, 26th, and 27th of September. Permission was obtained from all the landowners in the district to investigate their woods, parks, and pastures. The species collected reached 230, besides varieties. Considering the previous dry weather, this was most satisfactory. Among them were several of rarity and interest. A peculiar *Stilbum*-like mould, new to science, was found, the life history of which is in process of being worked out. Mr. G. Massee, F.R.M.S., F.L.S., read a paper on "The Modern Tendency of Mycological Study"; and Mr. Harold Wager, F.L.S., gave a *resumé* of his paper on "Fertilization in the Fungi." The members of the section turned up in almost full force. Mr. Massee was elected president for the ensuing year, and Mr. Chas. Crossland, F.L.S., of Halifax, the secretary.—*C. Crossland, Hon. Sec., 4, Coleridge Road, Halifax.*

CORRESPONDENCE.

At the suggestion of several correspondents we open with this volume a department in which our readers may address the Editor in letter form. We have pleasure in inviting any who desire to raise discussions on scientific subjects, to address their letters to the Editor, at 110, Strand, London, W.C. Our only restriction will be, in case the correspondence exceeds the bounds of courtesy; which we trust is a matter of great improbability. These letters may be anonymous. In that case they must be accompanied by the full name and address of the writer, not for publication, but as an earnest of good faith. The Editor does not hold himself responsible for the opinions of the correspondents.—*Ed. S.-G.*

Irish Plant Names.

To the Editor of SCIENCE-GOSSIP.

Sir,—I congratulate you on the interesting October number of Science-Gossip. Dr. Lang's beautiful pictures of butterflies remind one of pleasant days spent in some of the South European districts where *Thais*, *Papilio alexanor*, P. *podalirius*, and *Charaxes iasius* are flying.

Mr. Keegan would increase the interest of his valuable study of the Birch and Alder if he would tell us to what element of the xylem or phloem is due the toughness which makes the former tree so useful for the manufacture of brooms and for castigatory purposes. Also what particular substance in the birch-bark renders it capable of sustaining life in Lapland.

The article in your October number (*ante* p. 130) which I have especially enjoyed is that by Mr. J. H. Barbour on "Irish Plant Names." Will you permit me to make a few comments on this list? The colours are appropriately applied:—thus DEARG, red, to the poppy, etc.; GORM, blue, to *Centaurea cyanus*, etc.; BUITH, yellow, to *Senecio iacobea*, and to *Chlora*, etc. Very naturally also we find UISGE, water, as an element in the name of *Veronica beccabunga* and *Ranunculus aquatilis*. BAN, white; DUBH, dark; and GLAS, green, seem to occur occasionally in Irish plant-names. We are not surprised to find the epithet CLOCH, rock, applied to *Sedum acre*, and BOG, that is swamp, to *Scirpus*. As might be expected, MOR, big and BEAG, little or lesser, are of frequent occurrence. Some of the plant-names in Mr. Barbour's list are exact equivalents of the Latin and Greek. Thus BAINE, milk, corresponds to the *gala* in *Polygala*; TEANGACON to *Cynoglossum*. MUC, translates pig in pignut. I infer from COILEACH, cock, applied to the red campion that cockscomb is the name of this plant, not of *Rhinanthe cristagalli*. In this instance the Gaelic name is more applicable to the colour, and the Latin one to the shape of the corolla of these plants respectively. Doubtless Mr. Barbour will be able to give many additional explanations which my limited knowledge of the beautiful and melodious Gaelic language makes it impossible for me to offer. May I venture to suggest to him through your columns that he should reprint his valuable list in alphabetical order, translating the Gaelic words throughout? I am certain that all Irish botanists would welcome such a glossary. At the same time may I ask the author of this list, or some other Gaelic scholar, for information on one or two points? Can SIGHE (*ante* 131) be an error for SITHE, fairy? In that case foxglove, that is folk's glove or fairy's glove, would agree with the Irish name. Why is CRAN, tree, applied to the maple above all other trees? Why is the elm called a palm? Of course the willow goes by this name in England from the date of its flowering. What virtue has the plantain which deserves the epithet SPAN, healing? Above all I would suggest that SEAMSOG cannot possibly be anything else than a misprint for SEAMROG, the shamrock, sacred emblem of Erin. This becomes the more certain when we observe that Mr. Barbour attaches the name to *Oxalis acetosella*, the very plant which the great botanist Bentham, himself a Celt, identifies with the shamrock of Ireland.

In conclusion may I point out one or two omissions in the list? *Saxifraga umbrosa*, a typical West of Ireland plant, which the cockney absurdly claims as "London Pride:" this is St. Patrick's Cabbage. Though it may exist, like many an unfortunate Irishman, in a smoky wilderness, it is much more at home, as he also is, among the native bogs. *Eriophorum*, the cotton-sedge, is called CANA in Scotch Gaelic, probably also in the North of Ireland. I have read that in the Gaelic alphabet each letter is called after a tree. May I appeal to Mr. Barbour to give us this list of trees, and to you, Mr. Editor, to print it and so oblige those of your readers who love both Natural History and the sweet Gaelic tongue.

Inis Fail.

Bournemouth West.

Co-operative Science Collections.

To the Editor of SCIENCE-GOSSIP.

Sir,—Permit me to offer a suggestion as to the feasibility of conducting the study of many branches of natural history on the lines of co-operation, or if that word is objected to, brotherhood might be substituted; with a membership of most known collectors, and a central depôt for duplicates, which would be free to all who contributed their duplicates. A catalogue should be kept of all species on hand, to be revised frequently and arranged as to districts. A member studying any given species could have specimens from every district for comparison and study, which could be returned when no longer required and others given to him to fill blanks in his collection, until he collected them himself. The real work should be increasing the knowledge of the fauna of the district, to be possessed by the greatest number of students in that district.

A conchologist when collecting meets with innumerable beetles. If the assistance I have sketched were available, he would send his specimens to the depôt to be named, then without loss of time, he could consult any local works available in his neighbourhood, or could have works from the depôt where a circulating library could be established. By the time he got through the list of shells in his district he would be well advanced with the beetles, and so several branches could be worked together, such as butterflies and moths, spiders and mites, plant water bugs, etc. Members finding for the first time species new to the district should be accredited.

Instead of a collection being rough and tumble, and a source of irritation to the collector it might have been spick and span, and an endless pleasure. Each would feel that he was helping a brother less favoured than himself. The knowledge that the education of the many in his favourite pursuit was being promoted, would far outweigh the pleasure derived from the selfish possession of the objects themselves.

The manner in which members sent in their duplicates might be made the subject of commendation and mild criticism, and the spirit of generous rivalry and emulation might be fostered to carry forward the work at a greatly accelerated pace. It might also be made international, so that a complete family could be got together for exhibition at local gatherings.

The amount of subscription for membership should be low, so as to exclude none. Subscriptions to go towards rent, printing, and general expenses.

I think an appeal made to rich men of science would not be in vain for an endowment sufficient to establish the depôt, and pay caretaker and secretary. At first these offices might be honorary. If properly conducted such an institution would merit success, and be a distinct advance upon present methods. I have thousands of duplicates, and I have friends who have others for disposal in this way. Members are asked to contribute duplicates only, so in getting rid of their own they place at their own command the duplicates of every other member of the brotherhood, which would be a distinct gain. The journal, SCIENCE-GOSSIP, might be invited to become the medium of communication by members, and for the discussion of the best scientific methods of preservation, mounting, and general preparation of specimens for scientific study.

HUGH L. ORR.

186, *My Lady's Road, Belfast.*

NOTICES OF SOCIETIES.

Ordinary meetings are marked †, excursions °; names of persons following excursions are of Conductors. § Lantern Illustrations.

NORTH LONDON NATURAL HISTORY SOCIETY.

Nov. 2.—†A Holiday in the Highlands. J. A. Simes.
,, 11.—°South Kensington Museum. S. Austin.
,, 16.—†Life Histories of Woodlice and other little known Animals. T. B. Casserley.

TUNBRIDGE WELLS NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

Nov. 3.—§Moorish Architecture in Spain. Dr. H. Habgood.
,, 17.—§An Atoll. C. W. Andrews, B.Sc., F.G.S.
,, 23.—Dust. W. Carter, M.A.
R. R. Hutchinson, Hon. Sec., Belmont, Princes Street.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

Nov. 9.—Pocket Box Exhibition.
,, 23.—More Lazy Days. R. Adkin, F.E.S.
Dec. 14.—Meteorites. J. T. Carrington.
Stanley Edwards, F.E.S., Hon. Sec., Hibernia Chambers, London Bridge, S.E.

LAMBETH FIELD CLUB.

Nov. 6.—§November Meteors. A. C. D. Crommelin, F.R.S.A.
,, 11.—°To the Zoological Gardens.
,, 20.—Geological Notes. A. Collier.
F. P. Perks, Hon. Sec., 41, St. Martin's Lane, W.C.

ESSEX FIELD CLUB.

Oct. 27-28.—Annual Cryptogamic and Botanical Meeting, Epping Forest.
William Cole, Hon. Sec., Buckhurst Hill.

GEOLOGISTS' ASSOCIATION OF LONDON.

Nov. 3.—Conversazione in Library University College, 8 p.m. *Percy Emery, Hon. Sec.*

NOTICE.

SUBSCRIPTIONS (6s. 6d.) for Vol. VI. are now due. The postage of SCIENCE-GOSSIP is really one penny, but only half that rate is charged to subscribers.

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—SCIENCE-GOSSIP is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer. Notices of changes of address admitted free.

BUSINESS COMMUNICATIONS.—All Business communications relating to SCIENCE-GOSSIP must be addressed to the Proprietor of SCIENCE-GOSSIP, 110, Strand, London.

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EDITORIAL COMMUNICATIONS, articles, books for review, instruments for notice, specimens for identification, &c., to be addressed to JOHN T. CARRINGTON, 110, Strand, London, W.C.

NOTICE.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand.

THE Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid.* Duplicates only to be sent, which will not be returned, unless accompanied by return postage, and then at owner's risk. The specimens must have identifying numbers attached, together with locality, date, and particulars of capture.

THE Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

ANSWERS TO CORRESPONDENTS.

J.S. (Roxburgh).—The insect (*Tropicornis rufipes*), is one of the Hemiptera, or plant bugs. It is not uncommonly found by beating oak, birch, hazel, etc., into an inverted umbrella. It occurs throughout Britain.

C.S. (Forest Gate).—The specimen of white powdery s stance adhering to the skin about the bases of banana fruit, on the specimen forwarded, was much dried up and no appearance of any insect could be found. The white powder is suggestive of some scale insect (Coccidae) in its earlier stages. Your friends need not fear to eat the fruit, for even if a few of the animals were swallowed, they would soon be digested.

C.F.T. (Whitchurch).—The fungi are all of one species, *Icleroderma vulgaris* or "devil's snuff box," a generally abundant cryptogam. We are pleased to find you are again going to regularly take to SCIENCE-GOSSIP.

G.G.B. (Manchester).—We will enquire about the book to which you refer, and answer you in due course. We do not recollect it having been published.

A.G.S. (Preston).—Apply to Mr. Wilfred Mark Webb, 2 Broadway, Hammersmith, about the literature of the slugs of Ceylon. He may be able to assist you.

CHANGE OF ADDRESS.

C. S. COLES, from Hoe Moor House, Hambledon, to the Pheasantries, Hambledon, Hants.

EXCHANGES.

NOTICE.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

OFFERED. Duplicates of rare exotic shells (land, freshwater and marine) in exchange for other desirable species of exotic land.—Miss Linter, Saville House, Twickenham.

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GAULT, Greensand, Coralline Crag, Thanet Sand, containing Foraminifera or Forams from same. In exchange for other Material, or objects, or Sponge.—A. Henley, 303, Strand, London, W.C.

WANTED SCIENCE GOSSIP, one or two late volumes of Old Series, unbound preferred.—Particulars to G. Granville Buckley, Owen's College, Manchester.

OFFERED good Botanical Microscopical Slides, in exchange for rare Lepidoptera, or living ovae or pupae.—John Collins, 201, Green Lane, Birmingham.

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OFFERED, Lacroix's "Traité du Calcul e Differentiel et Integral," 3 vols., qrt., or Moigno's Legons. Wanted in exchange two first vols., second edition, Price's Calculus.—N. Blacklock, 19, Bruntsfield Avenue, Edinburgh.

FOREIGN LAND-SHELLS and pamphlets on Mollusca offered in exchange for choice specimens of invertebrates localised.—Wilfred Mark Webb, 2, The Broadway, Hammersmith, W.

WANTED to exchange, Golden Pheasants, cockerels or pullets, for Golden, Silver, Amherst, or other fancy pheasants.—C. S. Coles, The Pheasantries, Hambledon, Hants.

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